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Modification of Two Operants (Verbal and Non-Verbal) of Near-Mute Schizophrenics Using Reinforcement and Modeling Procedures.

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Major variables related to reinstatement of speech in hospitalized mute and near-mute schizophrenics were isolated and investigated. The study consisted of four parts: (1) verbal conditioning of mute and near-mute chronic schizophrenics using four experimental groups and two control groups, (2) four extra-laboratory measures for testing generalization from the experimental setting to the ward, (3) continuation of verbal conditioning with the same, different, or additional experimental procedures systematically applied to subjects in various probing strategies, and (4) conditioning a lever-pull response. Although the first ten verbal conditioning sessions indicated no significant group differences, useful information regarding the effects of the different procedures upon producing verbal behavior in individual subjects was obtained. The four extra-laboratory measures did not indicate generalization of the subjects' verbal behavior from the laboratory situation to the ward. The lever-pull experiment showed that the same stimulus which had not been a reinforcer in the verbal conditioning experiment served as a reinforcer for the lever-pull response. Increases in the verbal outputs of eight subjects indicated that some combinations of experimental treatments might be considered by therapists engaged in reinstating or developing verbal behavior. (PS)

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MODIFICATION OF TWO OPERANTS (VERBAL AND NON-VERBAL)[1] OF NEAR-MUTE SCHIZOPHRENICS USING REINFORCEMENT AND MODELING PROCEDURES

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Martin Sundel

This study isolated and investigated some major variables related to reinstatement of speech in hospitalized mute and near-mute schizophrenics. These variables included the effects of primary and generalized reinforcers applied in a systematic fashion contingent upon an S's verbalizations. Another variable concerned the effects of a social model in the facilitation of verbal output. The separate and combined effects of reinforcement and social imitation were investigated with four experimental and two control groups, each group consisting of three hospitalized psychiatric patients with low verbal output.

The focus of the investigation was specifically on increasing the frequency of verbal behavior. Previous investigation of this problem included studies geared toward maximizing the therapeutic effectiveness of reinforcement or modeling procedures without adequately testing or explaining the variables operative during treatment.

The stimulus materials that served as discriminative stimuli for verbal behavior included a variety of projected slides depicting landscapes, animals, cartoon figures, and adults and children engaged in everyday activities. In the modeling procedures the models spoke from a script describing the content of each slide.

Four major procedures were applied during the first ten experimental sessions: (1) reinforcement-only (2) model-only (3) model-plus-reinforcement; and (4) model-plus-reinforcement-plus-social-reinforcement. Pre-test and post-test measures of the Ss' verbal behavior were taken on the ward. The four extra-laboratory measures included a magazine pictures test, time sampling observations, the Wilson-Walters Verbal Behavior Rating Sheet, and the L-M Fergus-Falls Behavior Rating Sheet.

Additional sessions were conducted with some Ss under the same procedures as in the first ten sessions, while other Ss received prompting and response elicitation procedures; several Ss were systematically switched from one major treatment condition to another to determine the effects of the removal or addition of an experimental variable.

The results of the first ten sessions did not indicate significant differences among groups; Ss in control groups remained the same as during baselines. The data did provide, however, useful information regarding the effects of the different procedures upon producing verbal behavior in individual Ss. The four extra-laboratory measures did not indicate generalization of the Ss' verbal behavior from the laboratory situation to the ward.

The prompting and elicitation procedures were of considerable value in elucidating the conditions under which verbal behavior could be produced in particular Ss, and indicated the crucial importance of the E's or model's own verbal behavior in increasing the Ss' verbalizations. Systematically

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switching an S from one experimental procedure to another also demonstrated the relative effects of each procedure.

A second part of this study concerned the relationship between an S's performance in the verbal conditioning situation and his performance in a lever-pull experiment. Four Ss who had participated in the verbal conditioning situation were reinforced for pulling a lever. The data indicated that Ss who responded under the appropriate or inappropriate stimulus condition in the verbal conditioning situation responded similarly in the lever-pull situation. The data also showed that Ss conditioned at a higher rate on the lever-pull than in the verbal conditioning. A major finding of the lever-pull experiment was that the same stimulus that had not been a reinforcer in the verbal conditioning experiment served as a reinforcer for the lever-pull response.

High or moderate increases in the verbal outputs of eight Ss indicated that some of the combinations of experimental treatments might be considered by therapists engaged in reinstating or developing verbal behavior.

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CHAPTER I

Introduction

During the past several years, social workers, clinical psychologists, and psychiatrists have become increasingly interested in the application of principles from the experimental analysis of behavior to the treatment of problematic behavior in humans (e.g., Thomas, 1967; Ullmann & Krasner, 1965; Wolpe & Lazarus, 1966). Many of these studies have dealt primarily with maximizing the variables involved in the therapeutic situation, as contrasted with isolating and comparing the effects of the variables involved in producing client change, though several attempts have been made recently in the latter area (e.g., Paul, 1966; Wilson & Walters, 1966).

Behavior modification involves the utilization of techniques directed toward the acquisition, maintenance, or elimination of behavior. Discriminating behavior modification from other therapies are the techniques used, the independent variables emphasized (e.g., reinforcement), and the system of behavioral analysis commonly known as operant conditioning. Additionally, in contrast to therapies which have emerged from medicine, or from personality theory, behavior modification traces its roots to experimental laboratories in which studies investigating behavioral controls in infra-human organisms were conducted. Its foundations are also empirical findings of such studies. It tends toward a loose theoretical or atheoretical approach--at best a set of related principles primarily of a descriptive nature. (For more elaborate contrast of behavior modification and other theories see: Bachrach, 1965, pp. 62-63; Eysenck and Rachman, 1965, pp. 1-13; and Ullmann and Krasner, 1965, pp. 1-63.)

Operant conditioning techniques, established and developed by Skinner and his associates (e.g., Ferster & Skinner, 1957; Skinner, 1953), have been extended increasingly to a variety of educational and clinical settings (e.g., Lindsley, 1956; Ulrich et al., 1966). A large number of these studies are concerned with the modification of psychotic behavior among institutionalized schizophrenics (e.g., Ayllon & Haughton, 1964; King et al., 1960). Lindsley (1960) has described the severe deficits in conditionability of chronic schizophrenics as observed in the free-operant situation.

This study is concerned with the verbal conditioning of chronic schizophrenics. Reviews by Krasner (1958; 1965) and by Holz and Azrin (1966) showed that the majority of studies of verbal conditioning with humans have successfully altered specific response classes such as the frequency of plural nouns or statements of self-reference. These changes have been produced by use of primary reinforcers like candy or common generalized reinforcers such as head nod, "good," "mmm-hmmm," money, or accumulation of points (e.g., Hartman, 1955; Krasner, 1958.)

While generalized social reinforcers ("good," "um-hmmm") have demonstrated their effectiveness in conditioning verbal behavior of normals (e.g., Holz & Azrin, 1966; Krasner, 1958), there is evidence that schizophrenics may not be as responsive to such stimuli (e.g., Cohen & Cohen, 1960; Ebner, 1961; Mandler & Kaplan, 1956). Nevertheless there have been demonstrations of verbal conditioning with psychotics in the mental hospital setting. Many of these studies involve manipulation of patients' verbal behavior through reinforcement of appropriate or rational speech and non-reinforcement of inappropriate verbal behavior (e.g., Ayllon & Michael, 1959; Rickard, Dignam, & Horner, 1960). Ayllon and Haughton (1964) used this technique of differential reinforcement to increase normal speech and decrease psychotic speech in hospitalized schizophrenics.

The above studies have a common emphasis on alteration of the content of verbal behavior. In order to alter the content of verbal behavior, however, it is necessary that the individual first emit a sufficient amount of the desired verbal behavior, so that it can be reinforced and maintained. With functionally mute and near-mute Ss in whom the operant level of verbal behavior is minimal, the interest and efforts of the behavior modifier have been directed primarily toward the establishment and strengthening of verbal behavior *per se*. Kerr, Meyerson, and Michael (1965) shaped vocalizations in a mute autistic child, and Salzinger et al. (1965) developed a small vocabulary in two speech-deficient schizophrenic children through systematic application of reinforcement techniques. Cook and Adams (1966) increased the verbal outputs of three retarded children using candy, puppets, and social praise as reinforcers. Isaacs, Thomas, and Goldiamond (1960) used the method of shaping via successive approximation to reinstate verbal behavior in two long-term mute psychotics; chewing gum was used as the reinforcer in this situation. Sherman (1963) shaped verbal responses in a mute psychotic, who had previously communicated only by letter-writing.

The method of social imitation or model presentation can also be used when a socially desirable form of behavior is absent from an individual's repertoire or has a very low probability of occurrence (Bandura, 1965; Bandura & Walters, 1963). According to Bandura and Walters, the presentation of a social model who exhibits the behavior which the S lacks may considerably accelerate the treatment process, especially in cases where use of shaping procedures (Skinner, 1953) might be a slow and relatively inefficient means of developing desired behavior.

In order to develop novel responses or strengthen low frequency behaviors, a model may be presented to Ss under environmental conditions which facilitate social imitation. Baer and others (Baer, Peterson, & Sherman, 1965; Baer & Sherman, 1964) developed imitative repertoires in children by use of reinforcement procedures that were contingent upon the children exhibiting behaviors similar to those emitted by the model. The modeling technique, however, has been rarely employed as a treatment technique. Jones (1924) found that irrational fears could be acquired or removed as a result of children observing and imitating fearful or non-fearful responses of other children toward a particular stimulus situation. Lovaas et al. (1966) taught imitative speech to two mute schizophrenic children through development of a series of increasingly fine verbal discriminations. Sherman (1965) used combinations of reinforcement, fading, and social imitation procedures to reinstate verbal behavior in three mute psychotics. Sherman used food, candy, and social reinforcements to shape the Ss' speech. Shorkey and Sundel (1967) used a combination of reinforcement and social imitation procedures to reinstate speech in regressed mute schizophrenics. Various reinforcers, including M&M's, Fritos, pretzels, and cigarettes were used, in addition to social reinforcement. Clear and distinct words spoken by each of the four Ss increased from an initial range of 0-1 per session to 16-41 in the final session, with a mean of 28.

The Wilson and Walters (1966) study differed from previous investigations, in that it attempted to isolate the major experimental variables that were involved in producing changes in speech output in near-mute schizophrenics. Wilson and Walters increased the verbal output of the chronic patients through use of a model who fostered imitative verbal responses, and through a combined model-plus-reinforcement treatment condition. A control group which did not receive either of the experimental procedures showed minimal changes in verbal output. The control Ss viewed the same colored slides as did the experimental Ss, but received non-contingent reward in the form of an end-payoff. Baer and Sherman (1964) and Lovaas et al. (1966) also found that non-response-contingent reward was ineffective in producing behavior change.

The Wilson and Walters (1966) study did not include a group of Ss who received only reinforcement. It is possible that the near-mute Ss would speak about the slides if they received reinforcement in the absence of a model. A reinforcement-only group was omitted on the basis of a pilot investigation which had indicated this to be a slow and inefficient means of developing verbal behavior in near-mute Ss. Wilson and Walters also did not indicate a quantitative measure of near-mutism, other than ward reports. It would appear that an objective measure of an S's verbal behavior should be taken in the laboratory situation and a criterion rate of verbal output determined for mutism or near-mutism. The variability of many Ss' responding also requires that sufficient baselines be taken so that an accurate judgment of the Ss' response level is obtained.

Wilson and Walters (1966) used prompting in addition to the model-only and model-plus-reinforcement conditions. Because prompts were used to produce speech, it is difficult to separate out the effects of the prompts from the effects of reinforcement and modeling in their design. The prompts, of course, were used by Wilson and Walters to initiate speech in the Ss who did not respond spontaneously during the experimental sessions, and were thus useful from the therapeutic point of view.

Candy, money, and cigarettes have proved effective reinforcers for psychotic populations (e.g., Lindsley, 1960; Sherman, 1963; 1965). However, psychotic Ss could be suspicious of the Es and reluctant to participate in a study whose purpose is obscure to them. In such cases, it is necessary to find other ways of motivating patients to participate in treatment. Schwitzgebel and Kolb (1964) paid delinquents for speaking through a microphone and found that these Ss became motivated to come to the experimental setting and speak into the tape recorder. The Ss viewed their speaking task as a job in which they could earn money. A similar program was attempted in the present study, in which some Ss were also paid for speaking into a microphone and the Es emphasized to them that they were being paid for carrying out a job, that is, speaking about slides projected onto a screen.

The problem of generalization of treatment effects is one that has received increasing attention from behavior modifiers. The literature reflects some generalization of the effects of behavioral treatment (e.g., Wolpe & Lazarus, 1966). Rickard, Dignam and Horner (1960) altered the frequency of delusional speech in a 60-year-old psychotic through use of reinforcement techniques; two years later Rickard and Dinoff (1962) found that application of the same techniques produced almost immediate decreases in the S's delusional speech. Isaacs et al. (1960) reinstated verbal behavior in two mute psychotics; however, one S responded only to questions posed by the E in the experimental setting and did not respond to the E on the ward. In the second case, Isaacs et al. reinstated the S's verbal behavior both in the experimental setting and on the ward, but only in response to the E. The S's verbal behavior further generalized to the ward setting after the ward attendants ceased to reinforce the _S_'s non-verbal requests. Similarly, Sherman (1963) used a shaping procedure to establish a verbal response in a mute psychotic who communicated with ward attendants by writing notes. After some verbal behavior had been reinstated in the experimental situation, Sherman also instructed the ward attendants not to read the _S_'s notes. Consequently, the _S_ began to respond verbally to the ward attendants. Sherman (1965) reinstated verbal behavior in three long-term psychotics using reinforcement procedures. In a test of generalization, Sherman found that all three _S_s responded to a second _E_ in much the same manner as they had to the first _E_; moreover, the _S_s responded verbally on the ward as they had in the experimental room as long as a reinforcement schedule was maintained. Sherman found that the _S_s' verbalizing did not generalize greatly to ward attendants; Sherman attributed this failure to a lack of reinforcement for verbalizations. Using a ward rating sheet filled out by attendants, Wilson and Walters (1966) found that verbal behavior developed in _S_s in the experimental setting did not generalize to the ward. Wilson and Walters concluded that in order for generalization to occur, a study should be designed so that successive approximations to desired behavior on the ward are included.

Although the literature reviewed consists of psychological studies in which the behaviors of clients were altered, these studies are relevant to social workers who encounter clients with minimal verbal behavior. Because interviewing is a standard technique used in social work, and one which relies primarily upon verbal behavior, the implications of these studies for social work will be discussed in the Summary and Conclusions Section of Chapter III.

The purpose of the present study is to increase the frequency of verbal behavior in mute and near-mute chronic schizophrenics, and not to design an experiment which would maximize the effects of generalization. It is felt that before one can design an adequate study for generalization of laboratory behavior, one has first to demonstrate that behavior can be developed in a desired direction in the laboratory itself. Undoubtedly, a design that would maximize the possibility of transferring laboratory effects to the ward setting should include a series of training sessions for Ss which successively approximate the situation found in the ward setting. On the other hand, the ward setting itself may not be supportive of changes brought about in the experimental setting (e.g., Sherman, 1965). Ward staff may discourage increased verbalizations by the Ss, or not have sufficient time to help the Ss develop their newly-acquired behaviors. The present study, however, does include four extra-laboratory pre-test--post-test measures to determine whether or not generalization does occur from the laboratory to the ward setting. The present study is a partial replication of the Wilson and Walters experiment, in that the effects of a model-only condition and a model-plus-reinforcement condition are investigated in a similar design. The experiment is designed in such fashion that the separate effects of reinforcement and modeling can be observed, in addition to effects of various combinations of these procedures.

The first part of the study investigates the effects of four treatment procedures in reinstating verbal behavior: reinforcement-only, model-only, model-plus reinforcement and model-plus-reinforcement-plus-social-reinforcement. After the effects of these procedures are determined, systematic probes (e.g., Sidman, 1960) are used to investigate the additional effects of various elicitation and prompting procedures.

The effects of altering the order of presentation of the visual stimuli in the experiment are also investigated. The various probing procedures are used to show that systematic manipulations of procedural variables can reliably result in observable changes in the target behavior (see Sidman, 1960). A second part of this study contrasts two different operant response classes in selected Ss. An attempt is made to determine whether or not Ss who respond under discriminative control in the verbal conditioning situation respond similarly in a lever-pull situation. Lindsley (1956) found that psychotics often responded erratically and in cyclical patterns in lever-pull situations, and discriminative control was often difficult or impossible to establish. The present study investigates whether or not selected Ss of the verbal conditioning experiment are conditionable on a lever-pull and attempts to discover similarities between their responses in the two situations.

Specifically the following questions are explored:

Modification of Verbal Behavior

1. Do experimental groups show a greater increase in verbal responding than control groups?

2. Does a control group in which a person sits next to the S show greater increases in verbal behavior than a control group tested alone?

3. Do Ss in the different experimental groups show consistent patterns of responding that are related to particular treatment administered?

4. Which of the experimental treatments are most effective in developing verbal behavior in mute and near-mute chronic schizophrenics?

5. Does a direct elicitation procedure produce changes in speech for chronic schizophrenics?

6. Are elicitation-plus-reinforcement techniques more effective than reinforcement alone?

7. Do Ss tested with a model present more speech than Ss in a group receiving only reinforcement?

8. Does non-response-contingent reward result in increased verbal responding in the laboratory situation?

9. Do Ss have different verbal repertoires available for conditioning?

Generalization of Verbal Behavior

10. Do Ss receiving high scores from ward attendants on a Behavior Rating Sheet prior to undergoing the experimental treatments show the greatest increases in verbal behavior, and are those increases related to improved ratings on this instrument?

11. Does improved verbal behavior in the laboratory setting result in increased verbal behavior on the ward as measured by time sampling observations, a magazine pictures test on the ward, and a verbal behavior rating sheet?

12. Do experimental Ss show a greater increase in verbal responding on the ward than Ss in control groups, as measured on pre-test--post-test extra-laboratory measures?

Conditioning of a Lever-Pull Response

13. Are the Ss in the study conditionable on a lever-pull response?

14. Are the Ss' patterns of responding in the lever-pull experiment similar to those in the verbal conditioning situation?

15. Does a reinforcer have the same effect in the lever-pull experiment as it does in the verbal conditioning situation?

In summary, the focus of this study is on increasing the frequency of verbal behavior in mute and near-mute chronic schizophrenics; the study is not an attempt to alter the content of the Ss' verbal behavior, although models for appropriate verbal behavior are presented to Ss in three of the experimental groups.

CHAPTER II

Method

Subjects

The *S*s were 18 chronic male schizophrenics selected from 2 wards of severely regressed patients at Ypsilanti State Hospital, Ypsilanti, Michigan. At the beginning of this study, the *S*s ranged in age from 21 to 58 years, with a mean age of 46.4 years. The length of hospitalization of the *S*s ranged from 8.4 years to 33.5 years, with a mean length of 23.3 years. Time spans on the respective wards for *S*s ranged from several months to ten years, with a mean length of 4.8 years. The psychiatric diagnoses of the *S*s included representations of the various functional forms of chronic schizophrenia. Behavior problems posed by the *S*s on the ward included incontinence, difficulties in eating at meal times, mutism, and combativeness.

To select the *S*s for the study, the *E*s visited two wards of regressed male schizophrenics and asked ward staff to identify patients whose verbal outputs[2] were minimal and unrelated to known organic factors. Ward staff had recorded such information about the patients in their ward notes. In addition to ward staff knowledge of such patients, historical information describing incidents of mutism among these patients was found in the individual case files of the patients.

The names of 27 patients were submitted by the two head attendants; the list included names of patients submitted by attendants who had been on the respective wards for several years. This sample consisted of 20 *S*s from one ward and seven *S*s from the second ward.

The 27 *S*s were randomly assigned to 6 groups, 4 of which were experimental groups and 2 of which were control groups. Ward staff were instructed by the Division Psychiatrist that the *S*s were to be maintained on the same medications during the period of the study. The 27 *S*s were exposed to baseline conditions in the experimental setting. Twenty-one of these *S*s, whose operant level of verbal output during the baseline sessions averaged 25 responses or less per session, were included in the *S* pool for the study. The remaining six were dropped from the study.

Eighteen of the 21 *S*s had been randomly assigned among five groups (four experimental and one control). Thus, three groups contained four *S*s and two groups contained three *S*s. The three *S*s who occupied fourth positions in the four-*S* groups were considered as backup *S*s to be used in case any of the other *S*s had to be dropped from the study. None were dropped, however, so that the three backup *S*s were not utilized beyond the administration of pre-experimental baselines.

Three of the 21 *S*s, who had been randomly assigned to the sixth group (control), were not reassigned with the other 18 *S*s, as baselines had been taken in this control condition with the *E* sitting next to the *S*s in the experimental room. The verbal outputs of these three *S*s were within the criterion rate of 25 verbal responses or less per session, and were comparable to those of the *S*s in the other five groups.

The final sample included 12 *S*s in four experimental groups and six *S*s in two control groups, each group consisting of three *S*s. Fifteen *S*s were residents of the same ward, and three *S*s were residents of another ward.

The *E*s did not see the *S*s prior to their participation in the experimental situation. *S*s were told by the ward supervisors that they had been selected to participate in a speech improvement program. None of the *S*s objected to participation in the program.

Case summaries of the 12 experimental Ss are presented in Appendix A. Ss are referred to throughout the text, figures, and Appendices by an arbitrarily determined ordinal assignment to experimental or control group. For example, S32 refers to the second S in Group 3; S63 to the third S in Group 6. Groups 1 through 4 are experimental groups and Groups 5 and 6 are control groups. Group 6 refers to the control group in which an E was present in the room.

Setting and Apparatus

The experimental room was 14 ft. long, 14 ft. wide, and 10 ft. high, with white concrete walls. The S was seated in an armchair in the experimental room before a wall (the screen) on which were projected the colored slides that served as stimuli to elicit speech from the Ss. For two experimental conditions in which a model was used, a visual baffle was erected at one side of the room to enable the E to sit, in the role of speaker or listener, in view of the projected slides without being seen by the S. During the testing and training sessions, the S wore a Telex headphone-microphone set; the microphone, attached to the boom of the headset, picked up Ss' vocalizations. A Grason-Stadler M&M dispenser and Gerbrands penny dispenser, both housed in the control room, permitted the programmed dispensing of M&M's and pennies (the reinforcers) into a tray placed within easy reach of the S's left hand.

Next to the experimental chair was an easy chair in which the model, under one experimental condition, was seated beside the S. (See photographs of experimental setting in Appendix B.) On a table was a small aluminum box containing a Grason-Stadler digital counter for counting the number of reinforcements the S had earned in a given experimental session, and a 24-volt red stimulus light which was correlated with the operation of a ratio schedule. During the projection of the slides, the experimental room was dimly illuminated by a 25-watt lamp on the ceiling.

The experimental room and the control room were separated by a one-way-vision screen. Observation and recording of the S's responses were conducted in the control room. The control room contained an Airequipt Series 250-260 automatic slide projector, by means of which each slide was projected for 40 seconds on the screen in the experimental room. The interval between slides was 6/10 seconds.

Automatic control and recording equipment was used throughout the experiment. Responses made by the Ss, number of slides presented, and number of reinforcers dispensed were recorded on counters. Cumulative records of the Ss' responses were obtained for each session. The E in the control room wore earphones for listening to the Ss' speech. The S's verbalizations were recorded on a Viking tape recorder. A Wollensak microphone was used to speak to the S via his earphones.

A Grason-Stadler model E3236A timer and Grason-Stadler model E1100H timer were used for measuring response length and for pulsing the programming apparatus. A "response" consisted of 1 second of the S's continued vocalization. Whenever the S vocalized, he operated the voice-operated relay (VOR) apparatus. The VOR remained on until the S ceased to speak for a period of 1/10 second whereupon the VOR dropped out. If the S vocalized for at least 1 second without a pause of 1/10 second, each subsequent second of speech was counted as another response. Whenever the S stopped vocalizing for more than 1/10 second, the timer ceased to operate until the S again began to vocalize, at which time his resumption of speech was counted as the beginning of a new response.

The equipment was calibrated so that responses of less than 1 second duration were not automatically recorded. Because the speech of some Ss was nearly inaudible or of short duration, the required amplification of sound into the VOR would have resulted in artifactual counts of breathing, etc. Therefore, the E operated a switch which recorded responses of less than 1 second duration on a counter and activated an event pen on the cumulative recorder that registered these responses separately from the automatic equipment responses. The E could determine the occurrence of responses of less than 1 second duration by observing the timer, and by the failure of the automatic equipment to register the S's responses.

The equipment was calibrated prior to each experimental session so that the threshold of the VOR could be kept constant. In summary, vocalizations were recorded in two ways: If a response was 1 second or more in duration and above the VOR threshold, it was automatically recorded; if it was less than 1 second or of low amplitude, it was hand-recorded by the E. (At the conclusion of each session, responses that were automatically registered and responses that were hand-recorded by the E were entered on a form for Recording Verbal Responses for the S. A copy of this Form is found in Appendix C.)

Next to the experimental room was a room which the Es used as a "store." There the Ss exchanged the money they earned in the experimental sessions for candy, gum, and cigarettes. A detailed description of the storekeeper situation is found in Appendix D.

Another room adjacent to the experimental room was used as a waiting room. The Ss were brought from the ward by a messenger to the waiting room either individually or in groups of two or three; from there they were taken individually by the E to the experimental room. In the waiting room Ss sat at a table upon which were placed magazines for them to read.

Stimuli

Two classes of stimuli were used in this experiment: discriminative stimuli and reinforcing stimuli. There were five forms of discriminative stimuli. (1) A small red light remained on in the experimental room during the S^D condition. (Throughout the study, S^D will refer to the condition in which the red light was on.) (2) Auditory stimuli were available to the S via the headset and in situations in which a model spoke from behind the baffle. The content of the model's speech was dictated by a script that had been written for each slide and was used consistently with all Ss. (3) A third form of stimulus was that of the E when he was present and speaking in the experimental room. (4) Another form of stimulus was magazine pictures that were shown to the Ss on the ward. A description of the Magazine Pictures Procedure is found in Appendix E. (5) The stimulus materials that served as major discriminative stimuli in this experiment consisted of six sets of 20 Kodachrome 35mm slides depicting a variety of everyday scenes and activities. Each set included slides showing children, adults, landscapes, animals, action scenes, and cartoon-type pictures.

Reinforcing stimuli[3] were M&M candies which were dispensed to the S on FR1 during the experimental session and other candy, cigarettes and gum which were used in the storekeeper situation. Pennies were dispensed by the automatic equipment on an FR10 schedule. In addition to the pennies dispensed directly to the S during the session, the S was given one penny for every ten points registered on the counter at the end of the session. A point was registered on the counter every time the S made a verbal response during the S^D condition. The click that accompanied the registering of a response on the counter also could have served as a reinforcer. A fourth type of reinforcer was the "um-humm" or "good" delivered contingently by the E in the experimental room.

Design and Procedure

The design is a combination of pre-test / post-test control group and time series designs (Campbell & Stanley, 1963). The first phase of the verbal conditioning experiment involved four experimental groups and two control groups, each group consisting of three Ss with deficient verbal responding. The four experimental groups consisted of : (1) reinforcement only; (2) model-only; (3) model-plus-reinforcement; and (4) model-plus-reinforcement-plus-social-reinforcement. In the three experimental groups in which a model was used, the two Es alternated as the models on successive experimental sessions. Experimental procedures were applied for the first ten experimental sessions. Ss in the two control groups viewed the slides during pre-test and post-test baseline sessions but did not receive any additional treatment. In one of the control groups, the E sat next to the Ss during baselines. Pre-test measures of the Ss' verbal behavior on the ward were taken prior to the first experimental session, and post-test measures were taken after the tenth experimental session.

The slides were presented first under the S^{Δ} condition, in which the Ss were instructed only to look at the slides. During the second presentation of the slides (S^{D}), the Ss were instructed to speak about the slides. The two presentations of a slide set lasted 26-2/3 minutes; total session time for an S in the experimental room was approximately 30 minutes. The six sets of slides were presented serially to Ss across all sessions; therefore, over the baselines and first ten experimental sessions Ss viewed each slide set approximately three times. Ss were given only one session on a single day. The intervals between sessions varied slightly among the Ss because of hospital-routine requirements; however, all Ss were run over the same span of days. The sessions were conducted over a 12-week period.

The procedures varied in detail from session to session as described below.

Baseline Sessions 1-2 (BL1 and BL2). Baselines of verbal responding to the slides were taken for the 18 *Ss* on two occasions. Two baselines were used in order to check on possible daily fluctuations in the *Ss*' performance. The *E* greeted the *S* and told him that his speech would be tested. The *E* seated the *S* in the experimental chair facing the wall on which the slides were projected. The *E* told the *S* that colored slides would be shown to him twice. The *S* was instructed to look at the pictures and to think about them the first time they were presented (S^{Δ} condition). The *E* pointed to the S^{D} light, which he explained would be illuminated when the *S* was to begin speaking about the slides. TAT-type instructions were given to the *S* for talking about the slides. The *E* said, "tell us what you see in each picture, who the people are, what they're doing, and say anything that comes to mind about the picture." The *S* was told to speak only with respect to the slide being shown each time, and not to talk about anything else.

The *E* placed the earphones on the *S*'s head and showed him the attached microphone through which he was to speak. The *E* in the control room asked via the headset "Can you hear me?" If the *S* did not reply, the *E* said, "If you can hear me, please raise your right hand." After this "equipment check," the *S* was told that the slides would be presented, and the *E* left the room. After the slides were shown once, the $\underline{S}^{D}$ light came on, and the *E* signaled the *S* via the headset that he was to start speaking about the slides. At the end of the session, the *E* entered the experimental room and removed the headset from the *S*.

Pre-payoff Baseline Session (PBL-1). This session consisted of a pre-payoff baseline condition in which the *S* was paid before he entered the experimental room to determine the effects of non-response-contingent reward in producing changes in the S's verbal behavior. All 18 Ss were tested under this condition. The pre-payoff procedure was identical to the regular baseline condition, except that Ss were paid ten cents prior to the baseline session and were allowed to exchange the ten cents for a variety of reinforcers including candy, cigarettes, and gum.

Demonstration Session (D). The 12 experimental Ss were exposed to 15-minute instructional sessions in which the Ss' expected behavior was demonstrated and explained by the E. Ss in Groups 1, 3, and 4 received instructions in which the contingencies for reinforcement were verbally specified and demonstrated. When the S entered the experimental room, the E said "Today, Mr. _______, I will show you how you can get some candy and money." The E sat in the experimental chair and placed the headset over his own ears, while the S was seated beside him. The E spoke into the microphone and was reinforced with candy and pennies. The E pointed out to the S that it was specifically his speech that produced the reinforcements, and that payment occurred when the S^D light was on. The S was shown how the counter added up the number of responses made, and how these could be exchanged for money. The S was then seated in the experimental chair and the headset placed upon him. The E asked the S to speak into the microphone. If the S spoke, he was reinforced immediately. If his verbalization was too short to be registered by the automatic equipment he was reinforced by the E in the control room, who pressed a button which delivered reinforcement immediately. If his vocalizations remained too short or too low, the S was told to speak longer or loudly enough to activate the relay apparatus. When the S spoke, the E said, "That's right," or "Good." If the S did not begin talking, the E asked the S a pre-determined series of questions such as

"Where are you from, Mr. ______?" After the S had received approximately 30 pieces of candy plus several pennies, some slides were shown to him. If the S did not respond to the E's questions, the slide procedure was still introduced at this point. The S was told to speak about the slides in order to receive more reinforcements. The instructions for speaking about the slides were the same as during the baselines. The S was shown how reinforcement was delivered only in the presence of the S^D. The E continued to ask the S questions about the slides. The S was told that the more he spoke about the slides the more he would earn. The slides were shown successively until a total of 15 minutes elasped for the entire demonstration.

For the model-only group, the E told the S, "We're going to show you some more slides today, Mr. _________. I will speak first about the slides, and then I would like you to speak about them." The E sat in the experimental chair, put on the headset, and spoke about the slides. After ten slides had been shown individually on an alternating S^{Δ}-S^D basis, the E exchanged chairs with the S, and placed the headset upon him. The E instructed the S to speak only when the S^D light was on. During the session the E responded to the S's verbalizations by saying "Um-humm" and "Good" and by nodding approvingly.

Baseline Session 4 (BL-4). In order to test the effects of the Demonstration Session, another baseline session was administered to the experimental Ss. The procedure for this session was the same as for Sessions 1-2.

Experimental Sessions 1-10. During these sessions, Ss in Group 1 received M&M's on an FR1 schedule and pennies on an FR10 schedule for speaking about the pictures under S^D conditions. In the model-only group, the E, who served as a model, spoke continuously in response to each slide. The *S* could listen to the *E* talk, but was unable to see him during this S^{Δ} condition. After the slides were shown once, the S^{D} light appeared and the *S* was instructed to begin speaking about the slides. The third experimental group was similar to the *model-only* group, except that *Ss* were also reinforced for speaking. In the fourth experimental condition, the *E* himself wore the headset during S^{Δ} and spoke about the slides, while the *S* was seated next to him. The model in this condition was reinforced under the same conditions as was the *S*. The model ate the M&M candies and kept the pennies that were delivered. For the S^{D} condition, the model exchanged places with the *S* and placed the headset on him. In addition to receiving candy and money for speaking, the *S* received verbal reinforcements of "Um-hum" and "Good" administered by the *E*. If the *S*'s responses were too short or not loud enough to activate the automatic equipment, the *E* pressed a button which reinforced the *S*'s responses immediately. *Ss* in the two *model-plus-reinforcement* conditions were reinforced under S^{D} for both imitative and non-imitative verbal behavior; that is, the only requirement for reinforcement was that the *S* vocalized.

When experimental *Ss* were in Session 10, control *Ss* underwent another Baseline Session (BL-5); this baseline was the same procedure as used in Baseline Sessions 1-2. After the ten experimental sessions were administered to experimental *Ss* and the baseline sessions given to control *Ss*, post-experimental measures of ward behavior were taken for all *Ss*.

Experimental Sessions 11-31. Five additional sessions were conducted for the experimental *Ss* in which some *Ss* were continued under the same procedure as in the first ten sessions, while other *Ss* received additional prompting and response elicitation procedures;[4] several *Ss* were switched from one major treatment condition to another to determine the effects of the removal or addition of an experimental variable.

Table 1 shows the various experimental procedures administered to Ss beyond Session 10, with a key describing the ten additional experimental procedures administered in Table 2.

Six of the 12 Ss remained on the same procedure as before. For the other six Ss, experimental conditions were altered by using a probing strategy (e.g., Sidman, 1960) in which additional procedures were systematically added to the experimental situation to determine the effects of particular procedures in producing verbal behavior. A single slide alternation procedure was added during Session 11 for S13. In the single slide alternation procedure, each slide was projected for 80 seconds; during the first 40 seconds the S^{Δ} condition was on and during the second 40 seconds the S^{D} condition came on. For S12, prompting via the headset was added to the reinforcement only condition. In Group 2, the reinforcement variable was added to the model-only condition for S21; the pre-payoff condition was added to the model-only condition for S22. In Group 3, prompting via headset was added to the model-plus-reinforcement condition for S33. In Group 4, prompting via headset was added for S42. Prompting via headset consisted of either detailed or general prompts about each slide given by the E over the microphone to the S's headset.

In summary, after Session 10, five additional sessions were conducted with the experimental Ss. Six of these Ss remained under the same treatment conditions as before; one S was switched from one major treatment procedure to another; one S was switched from one session to reinforcement-plus-single slide S^{Δ}-S^{D} alternation; one S received a pre-payoff condition in addition to the model-only condition; and three Ss received prompting via headset in addition to their major treatment procedures.

After Experimental Session 15, four Ss were selected for additional treatments. S11 received 12 additional sessions; S13, six sessions; S21,

TABLE 1

Experimental Procedures Administered Over Treatment Sessions with Schizophrenic Ss

(See Key)

SESSION NUMBER

Subject	1 - 10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Group 1																						
S11	A——	——	——	——	——→	A	E	M_1	M——	——	——	——→	M	N——	——	——	——→	N				
S12	A	F——	——	——	——→	F																
S13	A	E	A——	——	——	——→	A	N——	——	——	——→	N										
Group 2																						
S21	B	C——	——	——	——→	C	A——	——	——	——→	A	E——	——	——	——→	E	P——	——	——	——→	P	A
S22	B	G——	——	——	——→	G																
S23	B——	——	——	——	——→	B																
Group 3																						
S31	C——	——	——	——	——→	C	A——	——	——	——→	A	E	E	Q——	——→	Q						
S32	C	H——	——	——	——→	H																
S33	C——	——	——	——	——→	C																
Group 4																						
S41	D——	——	——	——	——→	D																
S42	D	J——	——	——	——→	J																
S43	D——	——	——	——	——→	D																

TABLE 2

Key for the Various Experimental Procedures as Charted on Graphs

Major Procedures	A - Reinforcement only (Group 1)
	B - Model-only (Group 2)
	C - Model-plus-reinforcement (Group 3)
	D - Model-plus-reinforcement-plus-social reinforcement (Group 4)
Procedures using Systematic Probes	E - Reinforcement-plus-single slide alternation of S^{Δ} and S^{D} conditions
	F - Reinforcement only-plus-prompting via the headset
	G - Model-only-plus-pre-payoff condition
	H - Model-plus-reinforcement-plus-prompting
	J - Model-plus-reinforcement-plus-social reinforcement-plus-prompting
	M - Elicitation-plus-reinforcement (E in the room) under continuous S^{D} condition
	M_1 - Same as M, except with single slide S^{Δ} and S^{D} alternation
	N - Reinforcement-plus-prompting via the headset-plus-single slide alternation of S^{Δ} and S^{D} with prompting during both conditions
	P - Extinction
	Q - Same as N, except prompting only during S^{D} condition

16 sessions; and *S*31, 10 additional sessions. During these additional sessions, *S*11 received *single slide S^{Δ}-S^{D} alternation*, *elicitation-reinforcement*, and *prompting via headset*. *S*13 received *reinforcement-plus-prompting via headset under both S^{Δ} and S^{D}* conditions. *S*21 was switched, for five sessions at a time, to *reinforcement only* and then to *reinforcement-plus-single-slide-alternation*; *S*21 also received five *extinction* sessions. For five sessions, *S*31 received *reinforcement only*, for two sessions he received *reinforcement-under-single slide-alternation of S^{Δ}-S^{D}* conditions, and for three sessions he was exposed to *prompting during S^{D} of single slide alternation-plus-reinforcement*. In summary: Four *Ss* received additional sessions beyond Session 15 which were directed toward increasing the frequency of their verbalizations through systematic application of elicitation, reinforcement, and prompting procedures.

The general experimental atmosphere was a natural one, in that various social transactions took place between the *Es* and the *Ss* throughout the study. These social transactions took place when the *E* greeted the *Ss* during the beginning of the experimental sessions, when escorting the *S* from one room to another, and during the exchanges transacted in the storekeeper situation (see Appendix D). Furthermore, the *E* emphasized that *Ss* receiving reinforcement were working for their money as on a job, and the *E* did not tell the *Ss* that they were receiving therapy. Some *Ss* reacted quite favorably to this interpretation and viewed their experimental session as an opportunity to earn money as if they were on a job. From this point of view, the treatment was similar to that given by Schwitzgebel and Kolb (1964) to delinquents who were paid for speaking into a tape recorder.

Four independent extra-laboratory measures were taken of the *Ss*' behavior on the ward. The purpose of these ward procedures was to determine whether or not any increases in verbal behavior in the experimental setting generalized to the ward. The four extra-laboratory measures included an Observational Time Sampling Procedure, a Magazine Pictures Test Procedure, the Wilson-Walters Verbal Behavior Rating Sheet (1966), and the L-M Fergus-Falls Behavior Rating Sheet (1951).[5] The pre-test measures were taken prior to an S's first experimental session, and the post-test measures were taken after the tenth experimental session.

Two five-minute time sampling observations were taken of the Ss' verbal behavior on the ward for the pre-test measures, and two five-minute observations were taken for the post-test measures. An afternoon and evening measure were included for each S on both the pre-test and post-test measures. (A more detailed description of the Observational Time Sampling Procedure is presented in Appendix F.)

The second extra-laboratory procedure was the Magazine Pictures Test. During this procedure, magazine pictures were shown to the Ss on the ward. The Ss' verbalizations were tape recorded and afterward played back into the VOR apparatus in the experimental room, so that the Ss' verbal responses could be measured and recorded in the same manner as during the experimental sessions. (Appendix G provides a more detailed description of the Magazine Pictures Test Procedure.)

Two ward rating sheets were filled out by ward attendants. The ratings are attempts to indicate the frequency of certain behaviors including verbalizations. The Wilson-Walters Verbal Behavior Rating Sheet (1966) was filled out by six attendants for Ss on one ward, and by three attendants for Ss on the second ward. Because of limited ward staff time, four additional attendants on one ward rated Ss only on Item 2 of this instrument. All attendants were requested to indicate Ss who were completely mute. Attendants who filled out the forms had known the Ss in the study for at least two years, and some of the attendants had known the Ss for several years.

The L-M Fergus-Falls Behavior Rating Sheet (1951) was also filled out by ward attendants. This rating sheet also included an item regarding an S's talkativeness on the ward. Four attendants on one ward and three attendants on the second ward filled out pre-test measures for the Ss. An attempt was made to determine the relationship between the Ss' scores on the pre-test measures of the Fergus-Falls Behavior Rating Sheet and their performances in the verbal conditioning situation (i.e., prediction of verbal "conditionability").

Two attendants on one ward and three attendants on the second ward filled out both pre-test and post-test measures of the Fergus-Falls Behavior Rating Sheet, in order to determine whether or not increased frequency of verbal behavior for the Ss resulted in improved behavior ratings on the ward. A complete description of the L-M Fergus-Falls Behavior Rating Sheet is given by Lucero and Meyer (1951).

Procedure for Lever-pull Experiment

Four Ss (S11, S13, S21, and S31) in the verbal conditioning experiment participated in an additional experiment involving a Lindsley-type lever-pull apparatus. Ss were brought individually to a separate experimental room by the messenger. The S was seated by the E in a chair facing a panel upon which was mounted a light bulb and lever-pull apparatus; the lever-pull knob was located beneath the light bulb. When illuminated, the light served as the discriminative stimulus for the response of pulling the lever (S^D); the absence of the light was S^Δ for lever-pull. The 30-minute sessions involved alternating 15 seconds of S^D with 15 seconds of S^Δ for a total of 60 S^D and 60 S^Δ trials. The schedules of reinforcement used with Ss ranged from FR1 to FR5, depending upon the response characteristics shown by individual S̲s during the experimental sessions. The ratio schedule was increased by one unit when it was determined that an S̲ could maintain his previous characteristics of responding as the schedule was raised.

Behind the experimental room was the control room housing the operant conditioning equipment. The S̲'s responses were recorded on a cumulative recorder; automatic counters recorded the number of responses emitted by the S̲ under S^D and S^Δ conditions and the number of reinforcers dispensed by the equipment. A complete description of the apparatus used in the lever-pull experiment is available elsewhere (see Heck, 1968).

Metal washers were used as reinforcers for the lever-pull response. However, one S̲ (S̲13) received M&M's instead of washers after the end of his second experimental session.

At the beginning of the experiment, the S̲ was told by the E̲ that he would be reinforced in this situation under conditions similar to those of the verbal conditioning situation, except that the response required for reinforcement here was pulling a lever rather than speaking into a microphone. The S̲ was then asked "Under what condition were you paid in the speaking situation?" The appropriate answer to this question was, "When the red light is on." The S̲s were told that they could exchange the washers they earned for money at the rate of two washers per penny. The E̲ also said that the more the S̲s pulled the lever when the red light was on, the more they could earn. The E̲ left the room and the session began.

At the beginning of the second session, the E̲ demonstrated the appropriate lever-pull response to S̲s who had not responded appropriately during the first session. The S̲s were shown how pulling the lever when the red light was on produced the metal washers, whereas pulling the lever when the red light was off did not produce reinforcers. The *E* also demonstrated to the *Ss* that it was necessary to pull the lever out far enough to trigger the response mechanism, so that the responses could be reinforced.

After a session was completed, the *S* exchanged the washers for money. The *E* offered the *S* various items from the *E*'s store which the *S* could purchase with his earnings. The *S* was also told that he could keep his money if he preferred not to spend it in the *E*'s store.

The lever-pull experiment was conducted during a two-week period in which the four *Ss* participated in five (*S*21), six (*S*13), seven (*S*31) or nine (*S*11) sessions. Two *Ss* (*S*21 and *S*31) participated in both the lever-pull experiment and the verbal conditioning experiment during the same day with the verbal conditioning experiment preceding the lever-pull experiment. *S*21 participated for three days, and *S*31 for five days, under these conditions.

CHAPTER III

Results and Discussion

This section consists of four major parts. In the first, comparisons are made between experimental *S*s and control *S*s, experimental groups with each other, control groups with each other, and among *S*s within the different experimental groups. In the second, there is detailed discussion of the results obtained with selected *S*s who participated in additional verbal conditioning sessions, in which procedures were systematically varied to determine their effects in producing changes in the *S*s' verbal behavior. In the third, findings of the four extra-laboratory measures are presented and discussed. The fourth part deals with the lever-pull experiment which was conducted with four *S*s, and relationships between the *S*s' response characteristics in the verbal conditioning situation and in conditioning of the motor response are described.

It was stated earlier that responses of 1-second duration were recorded by the automatic equipment, and that responses of shorter duration were recorded by an *E* who pressed a button that registered the response on a counter. Separate analyses of the data were made using machine-recorded responses and *E*-recorded responses. However, for the most part, only the total numbers of responses made by *S*s are considered here.

Comparisons could also be made in terms of total responses during Phase I (S^{Δ} conditions), total responses during Phase II (S^{D} conditions), or total responses made during both Phases I and II of the experimental sessions.

For *S*s in conditions in which a model was used, Phase I consisted of the period in which the model spoke about the slides. *S*s in the reinforcement group and in the two control groups were instructed to begin speaking about the slides only when the discriminative stimulus (red light) appeared during Phase II. Ss in the modeling conditions were also signalled to speak by the appearance of the discriminative stimulus during Phase II. Responses made by Ss in Experimental Group 4 were not recorded during Phase I of the experimental sessions because of the structure of the experimental procedure. During Phase I, the model in this situation wore the headset, and his responses triggered the reinforcement mechanism; the model picked up the reinforcements delivered for his speech and ate them in the presence of the S. Thus, a complete modeling situation was constructed for the S to imitate during the Phase I period. The limitation in this situation, however, was that the S's verbal behavior was not recorded. To have done so would have required another headset for the S to wear, and one which would be connected with the equipment in the control room in such a manner that the S's responses could be recorded (a technically impractical condition). Comparisons among Ss in this group and those in other groups will be made using the total number of responses recorded for Ss.

Phase II data include responses made by the S at a time when he had been instructed to speak. Phase I responses involved an S's speaking inappropriately because he had been instructed only to look at the slides during that period and to think about them. Phase I data are considered here in determining the extent of discriminative control of verbal responding for Ss in the first three experimental groups.

The combination of Phase I and Phase II data includes the total number of responses made by an S during an experimental session. Since the major purpose of the study was to increase the frequency of verbal behavior per se, it is fitting that the data are analyzed so that comparisons of total verbal responses during a session can be made among individuals in the four experimental groups, and between these experimental groups and the two control groups. The Phase I and Phase II conditions of the experiment allowed the Es to determine the appropriateness of an S's responses, that is, whether or not the S's responses were made under the S^{Δ} (Phase I) or S^{D} (Phase II) condition. This discrimination procedure served to elucidate the relevance of the experimental variables being manipulated and was not designed primarily to produce discriminative control over an S's verbal behavior. The quality of verbal behavior produced by Ss varied from giggles, unintelligible sounds, and nonsensical utterances to clear, intelligible, and appropriate words, phrases, and sentences. For several Ss, duration of speech was shaped to increasingly longer periods (for a similar procedure see Lane, Kopp, Sheppard, Anderson, & Carlson, 1967), in some cases until Ss were consistently reinforced only for responses that were long enough to activate the automatic equipment (1 second or greater).

Machine-registered responses, as well as E-recorded responses, were emitted by all of the experimental Ss within the period of experimental treatments. Control Ss emitted a total of three machine-recorded responses and two E-recorded responses.

Experimental Ss who made short responses (less than 1 second) or long responses (1 second or greater) under S^{D} conditions responded similarly under S^{Δ} conditions. An exception to this pattern of responding occurred with two Ss (S21 and S31). These Ss formed the discrimination of verbalizing under appropriate stimulus conditions.

Three experimental Ss (S21, S31, and S43) emitted more long responses (1 second duration or greater) than short responses (less than 1 second duration). S33 emitted approximately the same number of short and long responses; eight Ss emitted more short than long responses. After being given instructions and a sample demonstration of amounts of verbal behavior required to trigger the machine, S21 emitted more long responses. Three Ss (S13, S22, and S43) increased their frequency of long responses during sessions in which they had arrived at the experimental setting in an active, somewhat agitated state; on such days, the Ss frequently spoke or rambled unintelligibly prior to entering the experimental room. During "non-agitated" days these Ss also emitted more short responses than long responses.

Five of the eight experimental Ss who made more short responses than long responses also emitted low frequencies of verbal output per session; in contrast, the three Ss who made more long responses than short responses produced comparatively high frequencies of verbal output per session.

The question of whether particular slide sets or slides were responsible for higher or lower rates of verbal behavior, or for shorter or longer responses, is difficult to answer. There did not appear to be such effects across individuals or across groups. Analyses of such relationships are confounded by the effects of practice over sessions, the experimental procedures, the instability of Ss' verbal behavior, and the repeated exposure to the same slides.

Table 3 shows the frequencies of verbal responding for experimental Ss and control Ss. The post-experimental baseline for control Ss does not indicate an increase in verbal output from that of the pre-experimental baseline sessions. On the other hand, total responses of

TABLE 3

Verbal Productivity of Six Groups of Schizophrenic Ss Under S^D Conditions Across Three Baselines, Three Experimental Sessions, and One Final Experimental Session (Number of Responses)

Experimentals:		Baselines I-III	E8-E10	E10
Group 1				
S11		0	1	1
S12		0	2	2
S13		4	1	1
	Total	4	4	4
Group 2				
S21		3	1	0
S22		0	0	0
S23		67	224	54
	Total	70	225	54
Group 3				
S31		1	22	10
S32		50	90	38
S33		0	0	0
	Total	51	112	48
Group 4				
S41		0	121	28
S42		0	0	0
S43		0	230	12
	Total	0	351	40
Controls:				Baseline 5
Group 5				
S51		1	No E8-E10	0
S52		0		0
S53		0		0
	Total	1		0
Group 6				
S61		4	No E8-E10	0
S62		6		0
S63		3		0
	Total	13		0

experimental Ss in Groups 2, 3, and 4 showed substantial increases in verbal output during experimental Sessions 8 - 10, as compared with the groups' lower frequencies of verbal responding for the three pre-experimental baselines. Experimental Ss in Group 1 did not show any changes in verbal behavior during this period. A comparison of the verbal behavior of experimental Ss on the tenth session with that of control Ss on the post-experimental baseline indicates a substantially higher frequency of total verbal responses for experimental Groups 2, 3, and 4 than for the two control groups. The verbal behavior of Ss in Group 1 was similar to that of the control Ss.

For intra-group comparisons across treatments, Table 3 shows that only one of the three Ss in Group 2 (S21) increased in verbal responses during Sessions 8 - 10 as compared with pre-experimental baseline frequencies; two Ss in Group 3 and two Ss in Group 4 increased their verbal behavior over the same period. For Session 10, one S in Group 2, two Ss in Group 3, and two Ss in Group 4 showed substantially greater frequencies of verbal responses than did the control Ss on the post-experimental baseline.

Regarding the two control groups, Ss in Group 6 showed slightly more responses than those of Group 5 for the pre-experimental baselines; the post-experimental baseline frequencies for Ss in both groups, however, were zero. Thus, the presence of the E in the experimental room for Ss in Group 6 did not produce increases in the frequency of their verbal behavior. None of the Ss in Group 6 attempted to speak with the E when he sat beside them; one of these Ss directed suspicious glances occasionally toward the E. The Es observed, however, that for the first baseline session, these Ss seemed somewhat less fearful of the experimental situation than Ss who were left alone in the room. This uneasiness with regard to being left alone, as manifested by some Ss' fearful and suspicious glances about the room, diminished as the Ss became more familiar with the experimental situation.

Figure 1 shows individual graphs of the Ss' total number of responses for Sessions 1 - 10 as a function of treatment procedure and training sessions. The data in Figure 1 are grouped according to the Ss' rates of responding under low, medium, or high levels. Low responders made less than 10 responses during Sessions 1 - 10, medium responders made more than 10 but less than 250, and high responders made more than 250 responses. Five Ss responded at low rates, three at moderate rates, and four at high rates. An increase in verbal output occurred among Groups 2, 3, and 4, the greatest increase occurring in the model-plus-reinforcement-plus-social-reinforcement condition (Group 4). The next highest increase occurred in the model-only condition (Group 2); these findings differ from the Wilson and Walters (1966) findings of greater increase in the model-plus-reinforcement group. The superiority of the model-only group over the model-plus-reinforcement group in this study, however, may have resulted from the high rate of responding of one S in Group 2 (S21) and the large variance in verbal output for Ss in that group. Otherwise, it might be expected that the greater increase in verbal output could be produced by the combination of model presentation and reinforcement. This appeared to be the case in the overall superiority of Group 4, although this, too, may have resulted from the large variance in the group and the high rate of responding for one of the Ss (S43).

The small sample size and large variance in verbal output within individual treatment groups makes it difficult to support any hypotheses regarding the relative effectiveness of the four treatment procedures.

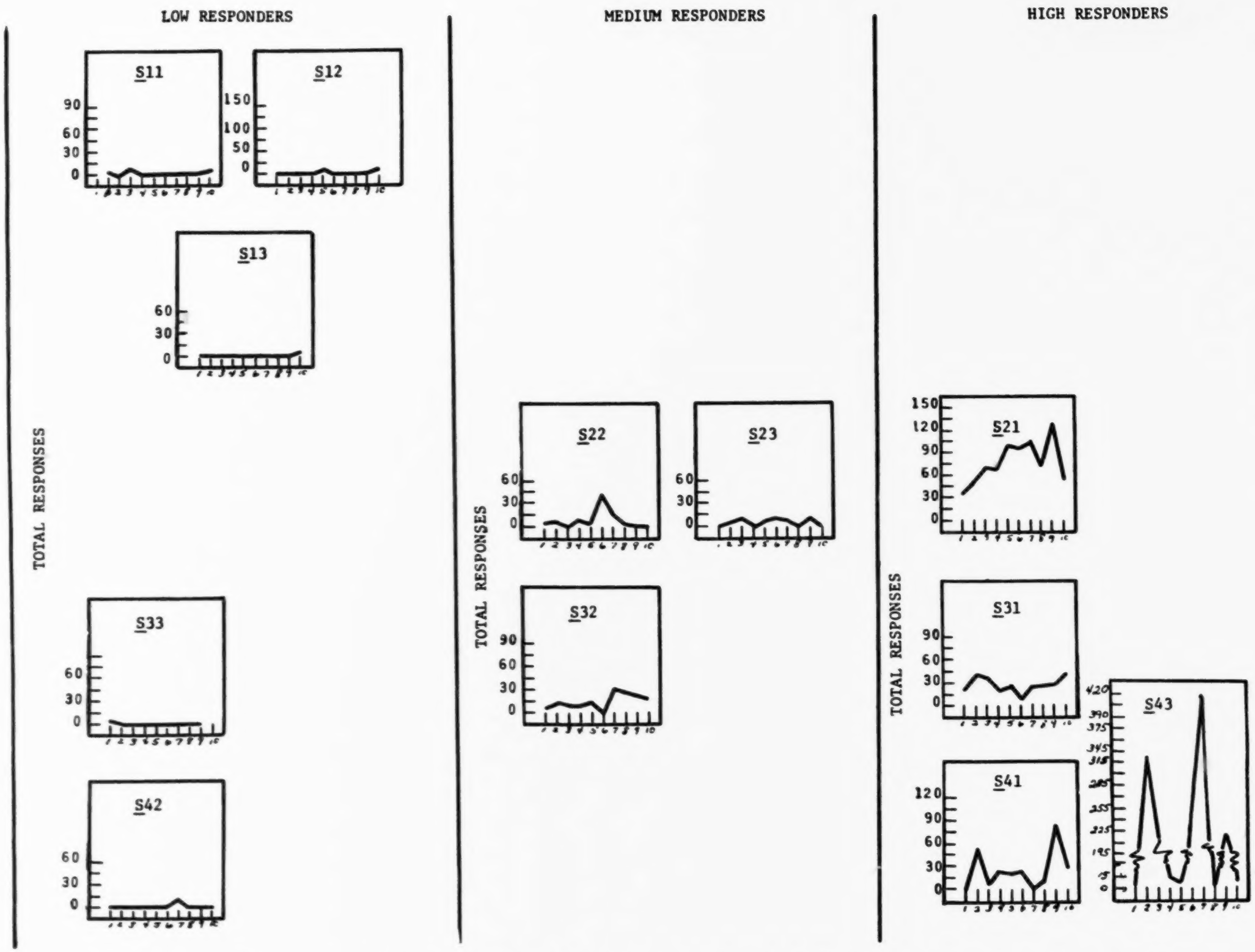


FIGURE 1. Frequency of Verbal Responding for Experimental Ss During the First Ten Sessions.

The minimal verbal output of the reinforcement-only group (Group 1) is consistent with Wilson and Walters' (1966) results. However, in a random sample of 12 Ss in which only five Ss in three groups showed increases in verbal output, there is a substantial probability that three Ss in a fourth group would have a low response frequency. If the results of this study and Wilson and Walters' (1966) findings are replicated in future studies, however, this might indicate that a human model in the experimental situation is a critical variable in the reinstatement of speech in chronic schizophrenics.

During the demonstration session following the first three baselines, verbal behavior was elicited from 11 of the 12 experimental Ss. Nine of these Ss spoke more than they had during any of the three previous baseline sessions and all 11 Ss spoke more during the demonstration session than they did for their average pre-experimental baseline session. The amounts of verbal behavior produced by Ss in the four experimental groups during the demonstration session varied; the order of verbal productivity from the highest to lowest group is indicated by Groups 4, 3, 1, and 2, respectively. The fact that the reinforcement-only group ranked third, and not fourth, in the amount of verbal behavior elicited during the demonstration session, could indicate that the subsequent experimental treatments in which a model was used constituted a critical variable for producing verbal behavior. Such an interpretation is in agreement with Bandura and Walters (1963) and Wilson and Walters (1966). Again, the small sample size and large intra-group variances in this study make it difficult to generalize these findings beyond the Ss in the study.

It is interesting that of the 11 Ss who had produced speech during the demonstration session, only one of these showed an increase in responses during the following baseline session; the other 10 Ss showed decreases in verbal output on the post-demonstration baseline. Furthermore, five of these 11 Ss emitted fewer verbal responses during any of the first 10 experimental sessions than they had for the demonstration session. Eight Ss emitted fewer mean responses per session over the first 10 experimental sessions than they did for the demonstration session; six Ss emitted fewer mean responses per session over the first 15 experimental sessions. At the end of the study, five Ss still had not achieved the verbal output they had produced during the demonstration session. The one S who did not verbalize during the demonstration session (S23) averaged less than one response per session during S^D periods over 15 experimental sessions.

Comparison of the demonstration session with the experimental treatment sessions involves consideration of the differences in procedures used in each. The demonstration session consisted of one S^D period in which speech was elicited by the E. The S^D period closely approximated the duration of the S^D periods for experimental sessions. Before showing the slides to the S during the demonstration session, the E had elicited verbal behavior relevant to the Ss' personal history; this was not done during the subsequent experimental treatments.

The results of the demonstration session indicated that the elicitation procedure, in which the E asked the Ss specific questions about themselves and about the slides, was effective in producing changes in the verbal output of these chronic schizophrenics. The four experimental treatments used during the first ten sessions of this study did not involve elicitation procedures. It is interesting that three Ss (S22, S23, S32) spoke more during the S^Δ condition than during the

S^D condition over ten sessions; the model's speech could have inappropriately elicited verbalizations from the Ss during S^Δ.

The greater frequencies of verbal output from Ss (S22, S23, S32) during the S^Δ period shows the importance of the model's presentation of verbal stimuli to them. These Ss tended to make echoic-type utterances, giggles, or unintelligible sounds in response to the model's speech. Another S (S21) who discriminated accurately between S^D and S^Δ conditions occasionally commented while the model was speaking about the slides. These data indicate that the model's verbal behavior was instrumental in producing verbal behavior in some Ss. It would be interesting to know whether a recording of the model's speech presented over the S's headset would produce the same effects as the presence of a model speaking in the experimental room. These data and the *demonstration* session data support the elicitation and reinforcement procedures used by Isaacs, Thomas, and Goldiamond (1959) and by Sherman (1963; 1965) with psychotics in a clinical setting, and are in agreement with the results of the more experimentally-controlled study of prompting and reinforcement procedures used by Wilson and Walters (1966). Unfortunately, these studies failed to separate the effects of the elicitation or prompting procedures from the effects of reinforcement. In the present study, however, the four separate treatment procedures were rigidly adhered to over the first ten experimental sessions; only in the *demonstration* session and in later experimental sessions for particular Ss were prompting and elicitation techniques employed.

During the *demonstration* session Ss received extensive instructions on how they were to respond during the subsequent experimental sessions. Ayllon and Azrin (1964) found that instructions, in addition to reinforcement, were required in order for mental hospital patients to consistently pick up their cutlery before meals. In the present study, directions were repeated to Ss during both the baseline and experimental sessions, so that the effects of instructions should have remained fairly constant over sessions. For the model-only group, speech was elicited for two of the Ss (S21, S22) during the demonstration session. During the demonstration session, Ss in Group 2 did not receive reinforcement, as did the Ss in the other three groups. Thus, elicitation in itself was effective in producing speech for S21 and S22 during the demonstration session. For the other three groups, the demonstration session involved elicitation, modeling and reinforcement.

There appears to be considerable difference among the techniques of reinforcing a verbal operant, eliciting a verbal response, and providing a model for imitation in their effects in producing verbal behavior. The results of this study do not indicate which of these procedures are most effective with particular individuals, since all Ss did not receive the same treatments. On the other hand, the results do indicate the effects of specific procedures administered to specific individuals over time. The data also show that control Ss did not increase in verbal behavior over the pre-test baselines (see Figures 2-7).

In summary, Sessions 1 - 10 indicated medium or high increases in verbal output for most of the Ss in Groups 2, 3, and 4. Ss in Group 1 produced minimal verbal behavior. Two Ss were under discriminative control of the slides and responded appropriately to the S^D - S^Δ conditions. Comparisons between groups were difficult to support because of high intra-group variances.

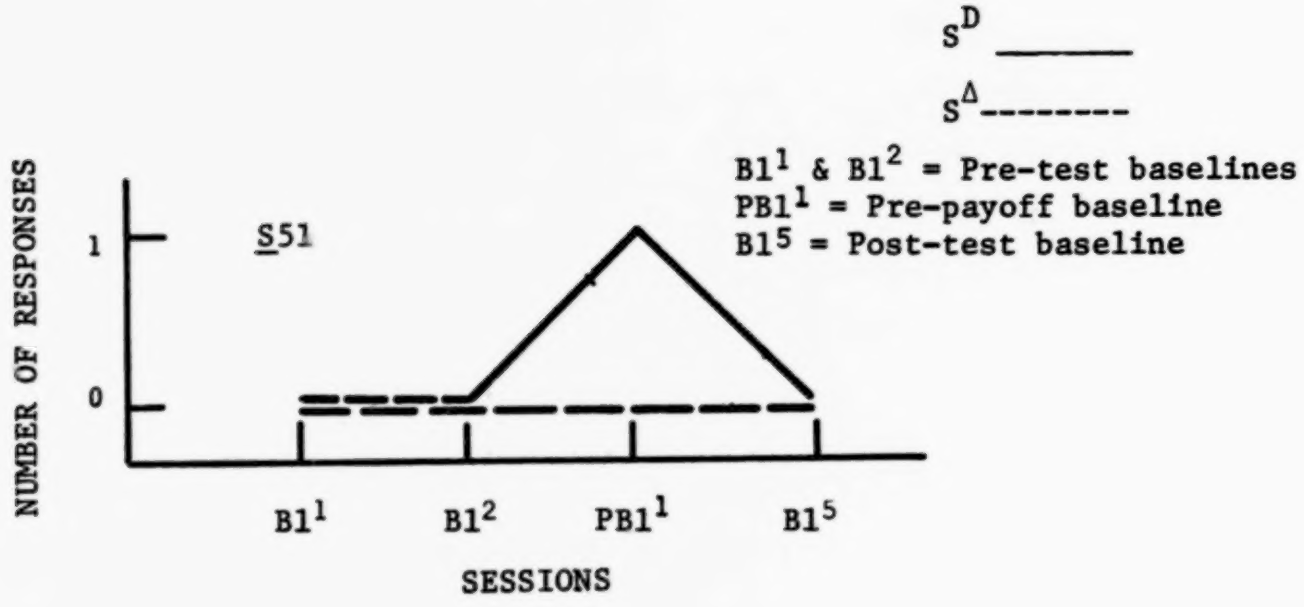


FIGURE 2

FIGURES 2 - 7. Frequency of Verbal Responding of Control Ss.

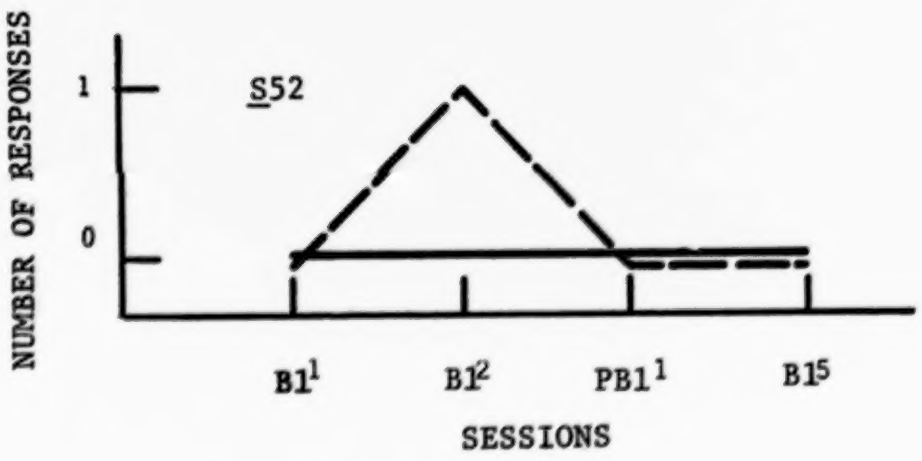


FIGURE 3

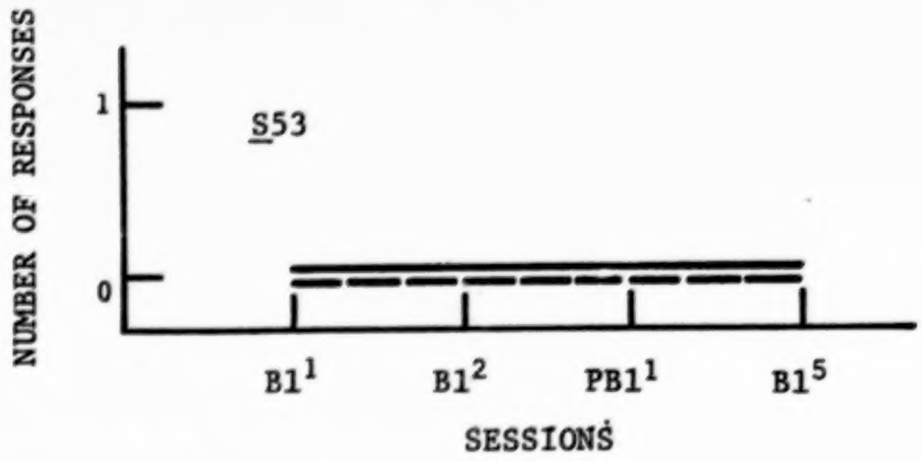


FIGURE 4

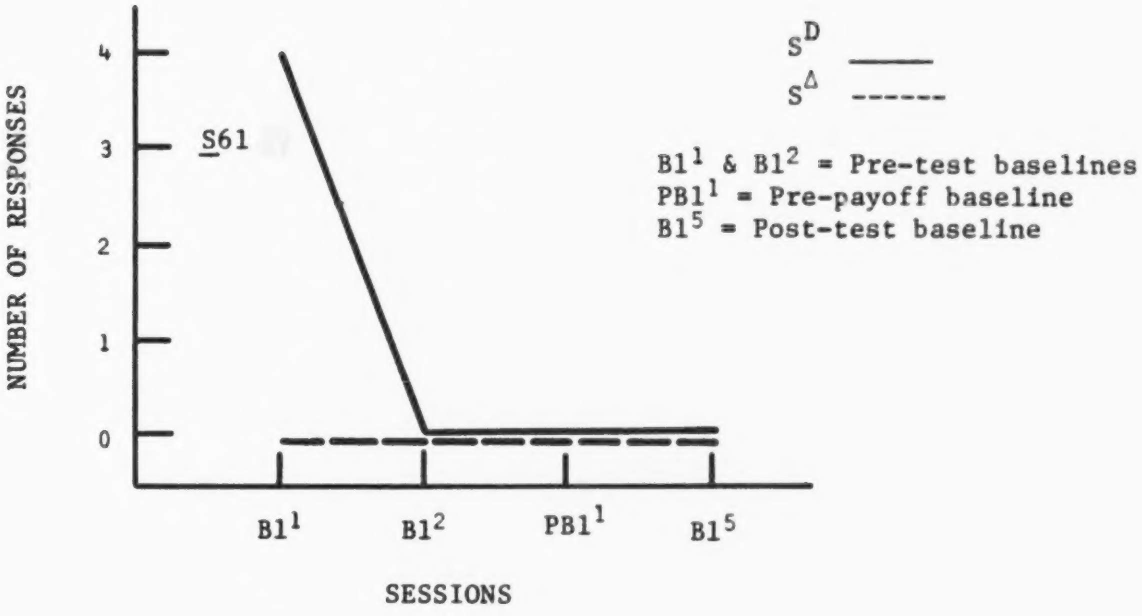


FIGURE 5

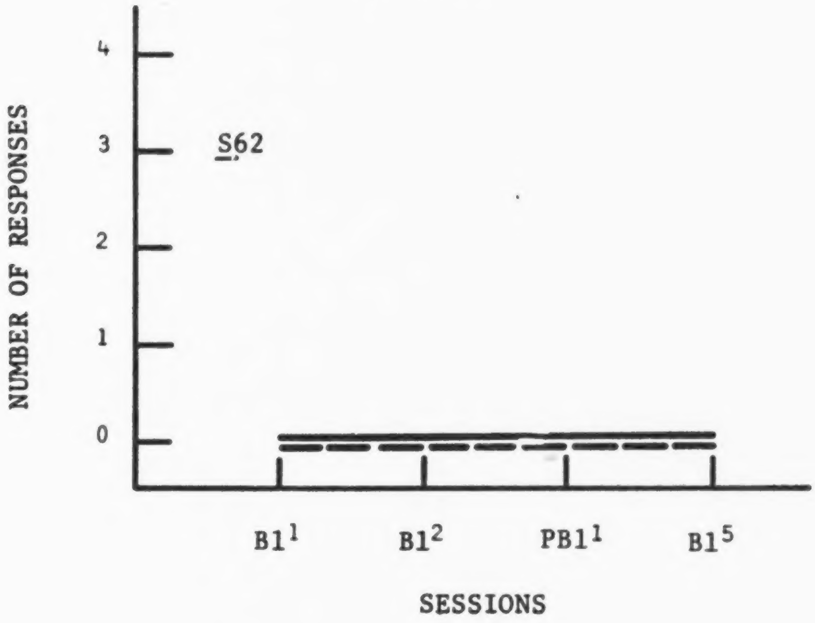


FIGURE 6

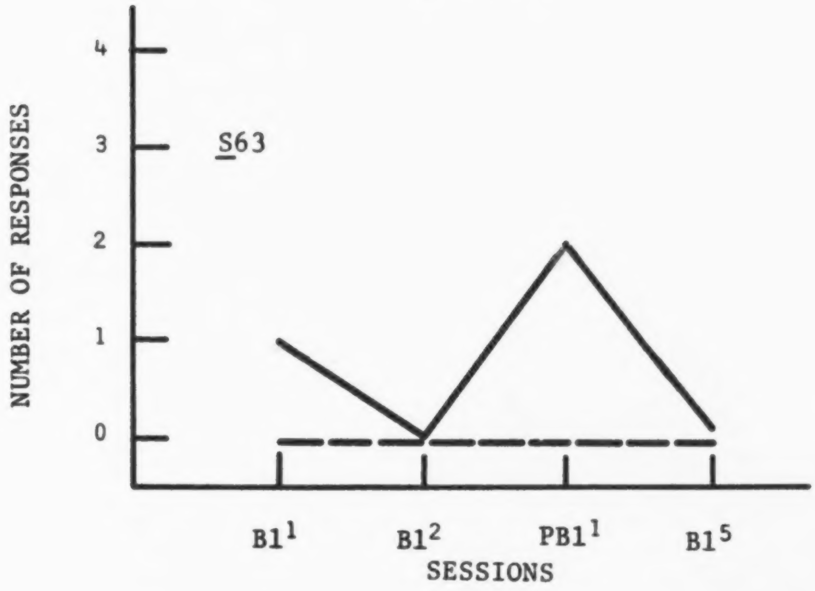


FIGURE 7

Later Treatments of Individual Ss

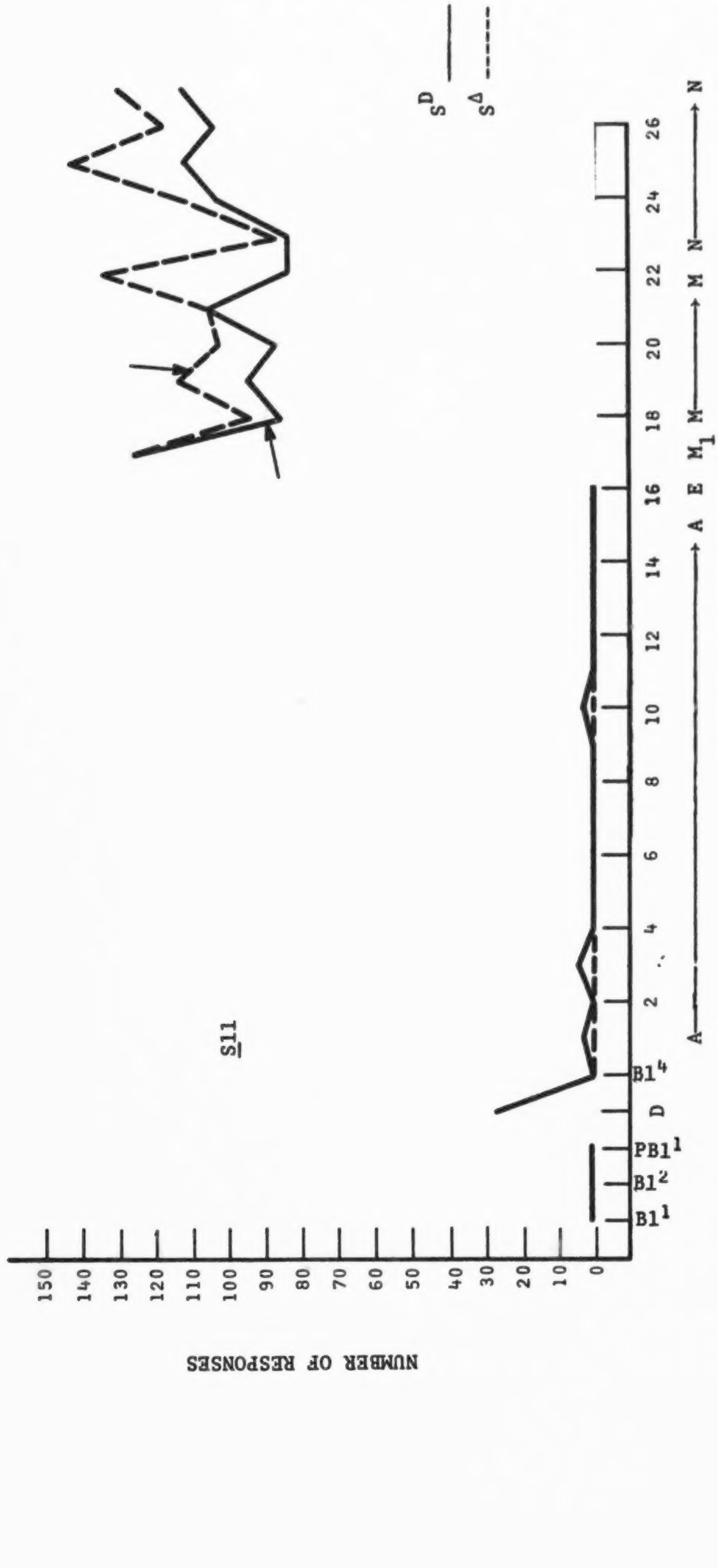
After ten experimental sessions were administered to Ss in the treatment groups, five additional sessions were held with six Ss who continued under the same treatment conditions as before. For the other six Ss, experimental conditions were altered by use of probing procedures and switching Ss from one major treatment condition to another.

After Session 15, probing procedures and systematic switching of Ss from one major treatment condition to another were conducted with four Ss for additional sessions. Beyond Session 15, 12 sessions were held with S11, 6 with S13, 16 with S21, and 10 sessions with S31.

Group 1. S11 continued from Sessions 11 - 15 under the same reinforcement procedures as in the previous 10 sessions; no increases in verbal output occurred during these additional sessions. The total number of responses produced by S11 for the 15 sessions was only four responses. During Session 16, the single slide alternation procedure was introduced in which S^D and S^Δ conditions were alternated for each slide as it was presented, as opposed to the previous procedure in which the entire slide set was presented to the S first under S^Δ and S^D conditions. The S's verbal behavior did not change under the single slide alternation procedure. It had been thought that the single slide alternation-plus-reinforcement procedure might keep the S more alert and ready to respond during the experimental session than during the reinforcement-only procedure. Since no change had occurred under regular or alternation reinforcement procedures, a more direct elicitation-plus-reinforcement procedure was introduced. This decision was based on the effectiveness of the elicitation and reinforcement procedures employed during the demonstration session, in which the S had emitted 27 responses.

During Session 17, the E remained in the room with the S and asked him specific questions about each slide as it was presented. As the S responded to the E's questions, the E maintained conversation with him regarding the content of the slides. The E encouraged S11 to speak within a more audible range, and reinforced him with words and gestures of approval for doing so. A dramatic change took place in the S's response rate; his verbal productivity increased from zero responses on the six previous sessions to 115 responses during this elicitation procedure (see Figure 8). Elicitation and prompting techniques were continued with S11 for the next ten sessions; the E encouraged him to respond during both S^D and S^Δ conditions so that the S could maintain his steady rate of responding, but told him that he would only be reinforced in the presence of the S^D condition. For the first five of these ten sessions, the E remained in the room with the S. For the last five sessions, prompting via the headset was given by a second E who spoke to the S from the control room. The S maintained the same high rate of responding throughout these ten sessions, and he produced more machine-recorded responses during the S^D condition than during the S^Δ condition. Thus, the S appeared to discriminate S^D and S^Δ conditions in that his longer responses were made during the condition in which he was reinforced. The S continued, however, to respond at a high rate under both S^D and S^Δ conditions.

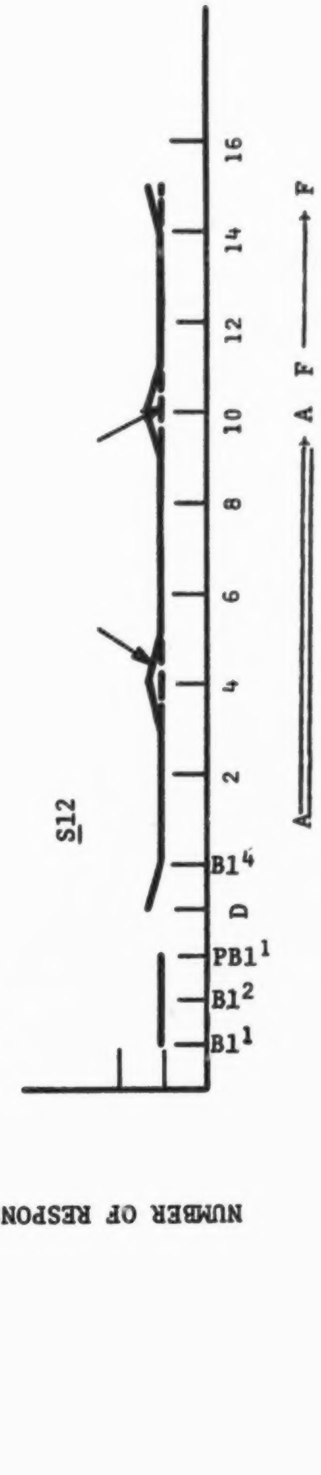
Several attempts had been made to fade out the elicitation or prompting procedures (both with the E in the room and via the headset) by asking S11 merely to speak about the slides without the E asking him specific questions about their content. S11 did not speak during these more general questions, so the E returned to specific questions.



SESSIONS AND PROCEDURES

FIGURE 8

FIGURES 8 - 9. Frequency of Verbal Responding of S11 and S12 Over Baselines and Experimental Treatments.



SESSIONS AND PROCEDURES

FIGURE 9

Responses made by S11 during these last ten sessions changed in quality from simple and often incorrect descriptions to more accurate responses, and to inclusion of statements of self-reference. The E helped to promote this change by providing accurate descriptions of the slides and by asking a series of questions about them which facilitated the S's understanding of their content (e.g., "I see four people in the picture. Can you count them?"). Along with this questioning, the E verbally reinforced the S's accurate responding to the slides. As the S began to respond more accurately, he also responded to questions of self-reference related to the content of the slides.

S11's changes in verbal behavior in the experimental setting generalized to some extent in other situations. The S spoke more to the E during the storekeeper situation, becoming more adept at money transactions. Two of the ward attendants spontaneously noted an increase in the amount of speech he produced on the ward during this period.

S12 produced only three unintelligible responses during the first ten sessions. Prompting via the headset-plus-reinforcement were applied during five additional sessions. No changes were observed in this S's verbal behavior (see Figure 9).

The third S in Group 1 also was exposed to systematic changes in experimental procedure beyond the first ten sessions. For the first ten sessions, S13 had emitted only one response. The single slide alternation procedure used with S11 during Session 16 was introduced to S13 for Session 11. S's frequency of responding increased dramatically during Session 11. Since S13 arrived at the experimental setting in an active, agitated state in which he also verbalized while in the waiting room, it was difficult to determine whether his increased verbal behavior was influenced by *single slide alternation-plus-reinforcement* or by his agitated condition. In order to test the effects of this sudden onset of agitation on *S*13's verbal behavior, the previous reinforcement procedure was reinstated on the following session. Since his high rate of responding continued under this procedure, it appeared that his agitated state was responsible for the increase in *S*13's verbal output. The *reinforcement-only* procedure was continued for four more sessions, in three of which the *S* remained in an agitated state and maintained his high rate of responding (see Figure 10). On the fifth reinforcement session, *S*13 arrived at the experimental setting in a placid state, and his verbal output was similar to that during the first ten sessions. Ward reports of the *S*'s behavior prior to arrival at the experimental setting also indicated the same agitated or placid states as were observed by the *E*s.

After observing *S*13's absence of verbal responding in the placid state under the *reinforcement-only* condition, the *single slide alternation* procedure was reinstated on Session 17. Because the *S* still did not respond during the early part of the session and was falling asleep, as he had done during the first ten procedures, *prompting via the headset* were introduced which indicated the S^D and S^Δ conditions for *S*. The *S* responded to this modification in the *reinforcement-plus-single slide alternation* procedure, but he responded echoically to the prompts given in both conditions, without forming the proper discrimination required for receiving reinforcement. The *S* also had to be reminded each time he was reinforced to pick up his candy and eat it. Under these procedures, *S*13's behavior increased, although he continued to respond echoically to both S^D and S^Δ conditions. Throughout all of the

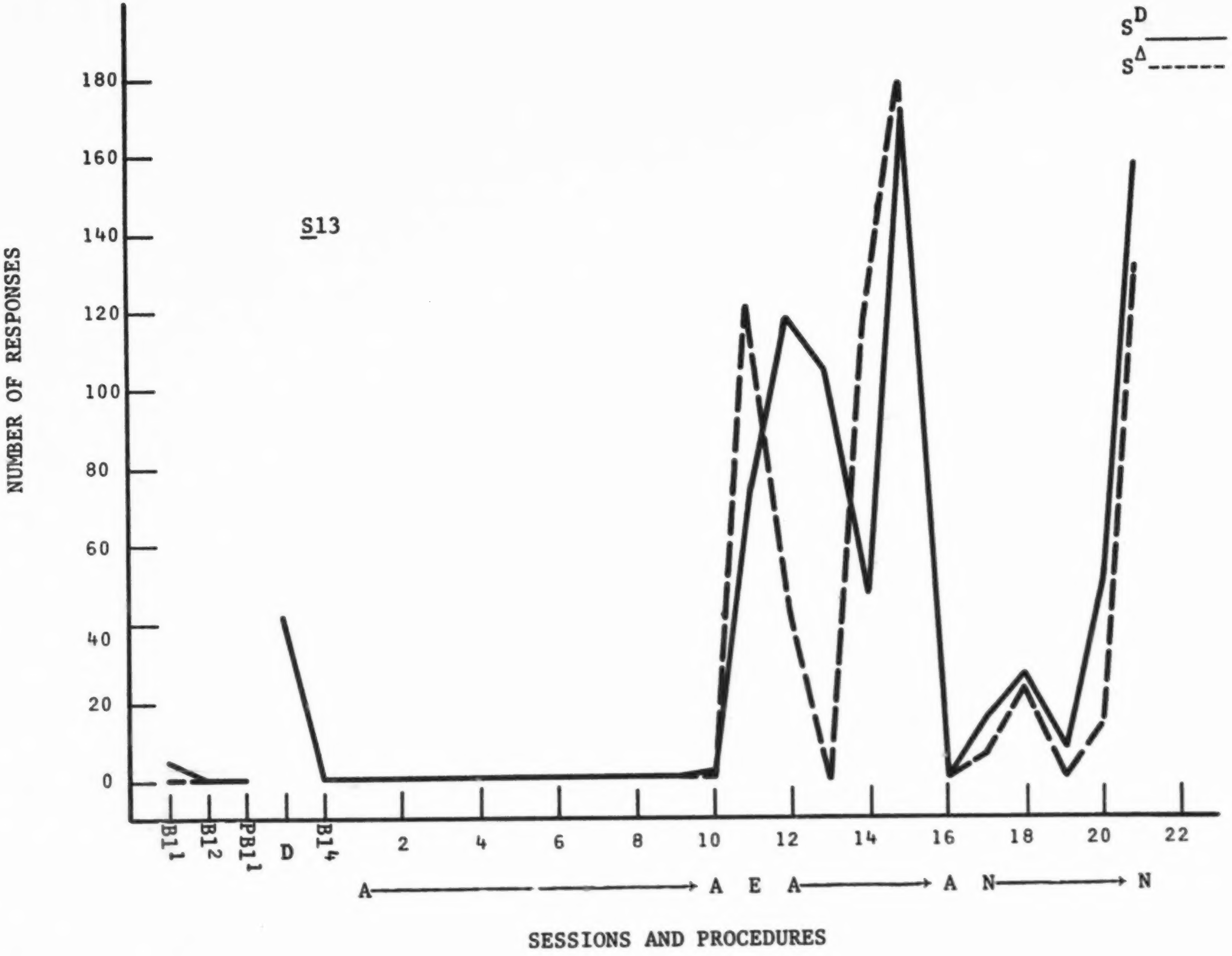


FIGURE 10. Frequency of Verbal Responding of S13 Over Baselines and Experimental Treatments.

experimental sessions, the *S* never spoke with regard to the content of the slides. During agitated states, *S* frequently cursed and spoke nonsensically. Although the *S* never formed the S^D and S^Δ discrimination, the majority of his machine-recorded responses occurred during the S^D condition and while in an agitated state.

In comparing the verbal output of *S*11 and *S*13, both of whom were high responders in later sessions without forming the proper S^D and S^Δ discrimination, the patterns of responding for the two *Ss* are different (see Figures 9 and 10). Coinciding with his agitated or placid states, *S*13 responded with either high or low rates of behavior, respectively. On the other hand, *S*11 showed consistent rates of behavior over the ten elicitation-reinforcement sessions.

Group 2. Two *Ss* received variations in treatment procedures after Session 10. *S*21 was switched to *model-plus-reinforcement* condition for Sessions 11 - 15. *S*21 had maintained a moderately high, steady rate of responding for the first ten sessions. *S*21 immediately responded appropriately to the S^D and S^Δ conditions, and his speech was under control of the slides. Much of his speech was similar to the model's descriptions of the slides, although he included his own interpretations, using intelligible words, phrases, and sentences. *S*21 also spoke in sufficient duration to trigger more machine-recorded than *E*-recorded responses. *S*12 was the only *S* in the study whose post-demonstration baseline frequency was higher than that of any of the previous sessions.

The addition of the reinforcement variable to the *model-only* situation for *S*21 during Sessions 11 - 15 resulted in an increased frequency of responding over Sessions 1 - 10 (see Figure 11). Prior to addition of the reinforcement variable, *S*21 said that he was getting

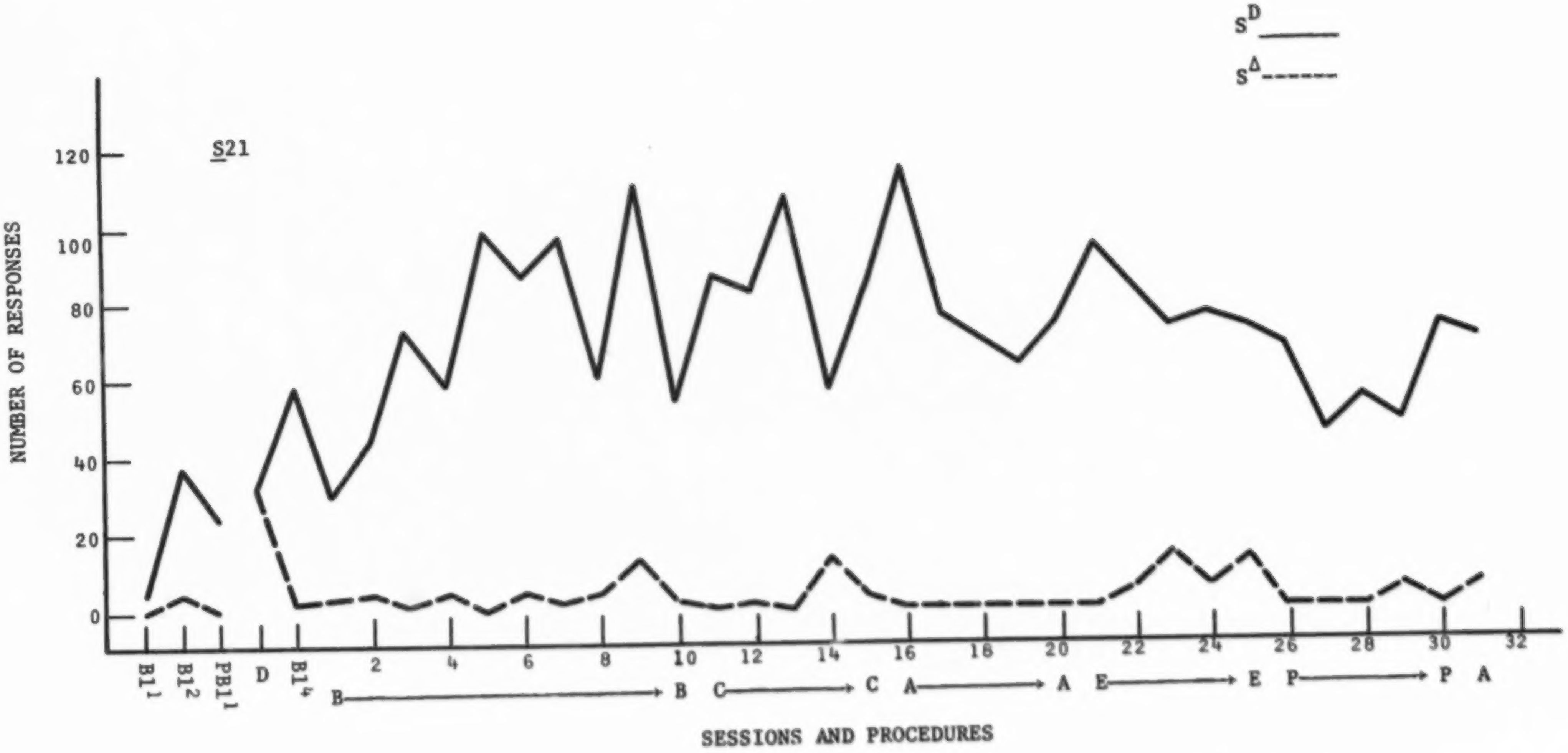


FIGURE 11. Frequency of Verbal Responding of S21 Over Baselines and Experimental Treatments.

tired of talking about the slides and wished to terminate. After the reinforcement variable was included, *S*21 expressed the desire to continue coming to the experimental sessions.

Because *S*21 maintained a high steady rate of responding during the *model-plus-reinforcement* procedure and was under both discriminative and reinforcement control, the model was removed from the experimental situation for Sessions 16 - 20, leaving *S*21 in the *reinforcement-only* condition. Although *S*21 maintained a consistent pattern of responding, his response rate dropped slightly from that of the *model-plus-reinforcement* condition. It is interesting to note, however, that with the model out of the room he emitted no responses during the S$^\Delta$ condition. *Single slide alternation-plus-reinforcement* was introduced for Sessions 21 - 25, and *S*21's rate of verbal output increased to a slightly higher rate than that of the *model-plus-reinforcement* procedure. This increase seemed in part related to the fact that during the S$^\Delta$ period, *S*21 consumed the reinforcers he had earned during S^D; whereas in the *reinforcement-only* situation, his lower rate might have been due to his eating the reinforcements during S^D. The increased rate of responding during the *single slide alternation-plus-reinforcement* might also have resulted from *S*21's having a better opportunity to think about each slide separately before he spoke about it.

During Sessions 26 - 30, an *extinction* procedure was introduced to determine the effects of removal of reinforcement. As predicted (e.g., Ferster & Skinner, 1957), *S*21's verbal behavior decreased to pre-experimental frequencies of responding. The *reinforcement-only* procedure was reinstated for Session 31, and *S*21's frequency of responding returned to his characteristic level of output. *S*21 more than doubled his rate of verbal output during the course of the experimental sessions.

At the end of treatment, *S*21's speech had improved in clarity and he made many more statements of a projective nature, in contrast with his almost totally descriptive types of statements at the beginning of the study. *S*21 initiated conversation with the *E*s and with the messenger, and carried out appropriate exchange transactions with the *E* in the storekeeper situation. The ward physician noted substantial improvement in *S*21's speech and overall condition, and hospital staff agreed that *S*21 could be placed into the community on a family-care basis. The contribution, if any, of *S*21's participation in the experiment to his recent improvement is a matter of conjecture.

A *pre-payoff* procedure was introduced for *S*22 during Sessions 11 - 15, in which *S*22 was paid ten cents prior to the experimental session. Since money appeared to have no value for this withdrawn *S*, the payment was exchanged for cigarettes and candies that were reinforcing to the *S*. During Sessions 1 - 10, *S*22 produced a low unstable rate of verbal output, though there were two sessions in which he responded at a relatively higher rate. The higher rate of verbal output occurred when *S*22 arrived at the experimental situation in a somewhat agitated state. *S*22 verbalized over twice as much during the S^{Δ} condition than during the S^{D} condition. His speech was either unintelligible or specifically imitative (i.e., responding echoically to the model's speech).

The *pre-payoff* procedure was introduced during Session 11 to determine whether or not being paid non-contingently in the experimental situation would increase verbal output. No changes occurred in *S*22's behavior upon application of the non-response contingent pre-payoff procedure. *S*22's rate and characteristics of responding during Sessions 11 - 15 were similar to his behavior over Sessions 1 - 10 (see Figure 12).

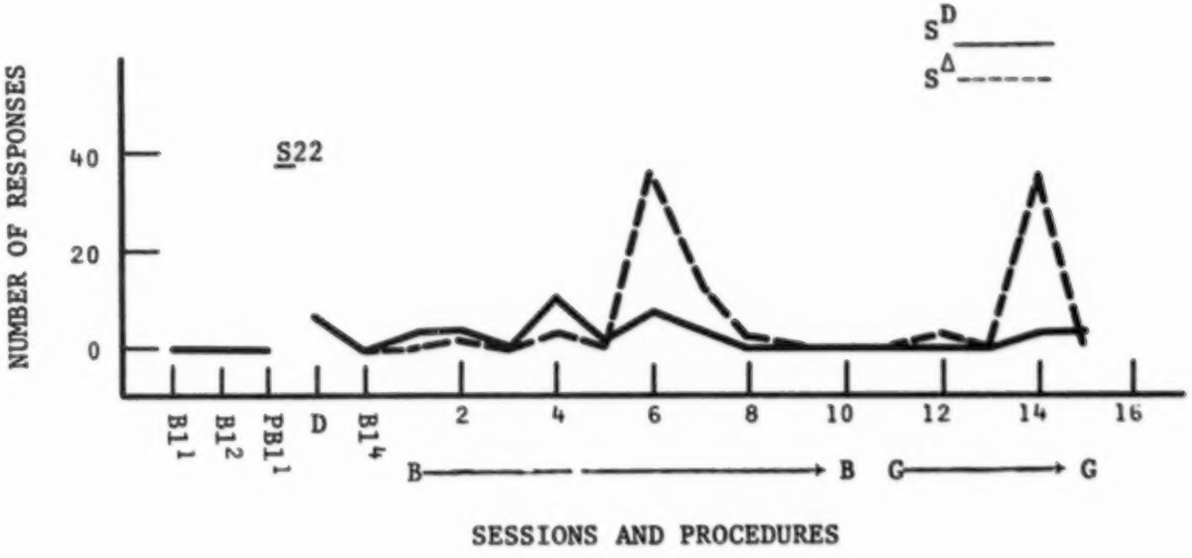


FIGURE 12

FIGURES 12 - 13. Frequency of Verbal Responding of S22 and S23 Over Baselines and Experimental Treatments.

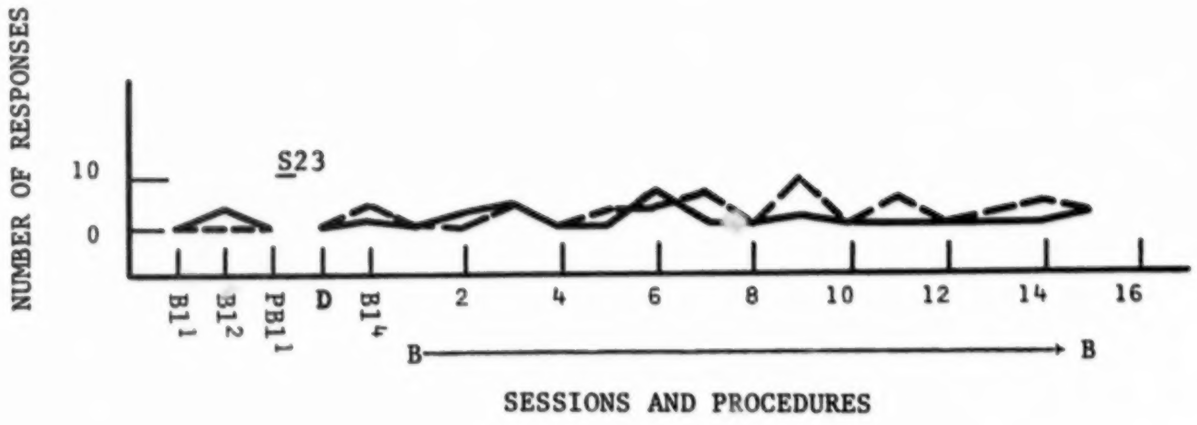


FIGURE 13

*S*22's frequency of verbal responding was low for most of the sessions, though he produced more verbal behavior during most experimental sessions than he had during the baseline sessions. He did not carry out appropriate exchange transactions with the *E* in the storekeeper situation.

Cigarettes were particularly reinforcing to *S*22. He smoked a cigarette down to a tiny stub, skillfully manipulating it between his fingers.

*S*23 was continued under the *model-only* procedure for Sessions 11 - 15. *S*23 had responded at a low frequency during Sessions 1 - 10, most of his responses occurring during the S^{Δ} condition. His frequency and pattern of responding remained the same over Sessions 11 - 15, with the same minimal output and inappropriate responding as produced in the previous sessions (see Figure 13). *S*23's rate of responding, though minimal, increased over that of the baseline sessions. His speech was garbled and unintelligible.

*S*23 was the only *S* in the study who did not verbalize during the *demonstration* session. A reinforcement-elicitation demonstration procedure might have had different effects on *S*23's behavior. *S*23 usually smiled when the *E* spoke to him; during the last three sessions, *S*23 responded verbally to the *E*'s greetings. During the Magazine Pictures post-test, which was administered by a different *E*, *S*23 showed an increase in responses over the pre-test score. The *E*s reported, however, that *S*23's responses included refusals to speak about the magazine pictures, which at least indicated that *S*23 was aware of the behavior requested of him in that situation.

*S*22 and *S*23 were both low responders. *S*22's speech was more specifically imitative of the model's speech than *S*23's, whose responses were frequently those of "mmmmhmmm" and concurrence. S22 and S23 were not under discriminative control of the slides, nor did they discriminate appropriately between the S^D and S^Δ conditions.

Group 3. S31 and S32 were continued on the model-plus-reinforcement procedure for Sessions 11 - 15; S33 also continued under this treatment but was also administered the additional procedure of prompting via the headset. For Sessions 1 - 10, S31 had responded consistently under the appropriate stimulus condition, and was under discriminative control of the slides. S31 responded during the first few seconds after a slide was presented, but spoke only with short descriptive words or phrases. S31 did not eat candy when delivered, but saved it until the end of the session, after which he ate some and took the rest with him to the ward.

For Sessions 11 - 15, S31 maintained an almost identical rate and pattern of responding as during the first ten sessions (see Figure 14). Since S had not imitated the model's speech during Sessions 1 - 15, he was switched to a reinforcement-only condition for Sessions 16 - 20. S31's verbal output dropped slightly over Sessions 16 - 20; this decrease might have been related to the model's absence. The reinforcement-plus-single slide alternation procedure was introduced for Sessions 21 - 22, and S31's verbal output increased to slightly higher than that of the model-plus-reinforcement procedure used in Sessions 1 - 15. The reinforcement-plus-single slide alternation procedure resulted in increased verbal output for S31 in the same manner that it had for S21; both of these Ss also responded appropriately to S^D and S^Δ conditions.

Because S31's rate remained at a comparatively moderate but consistent level, prompting via headset were added to the reinforcement-

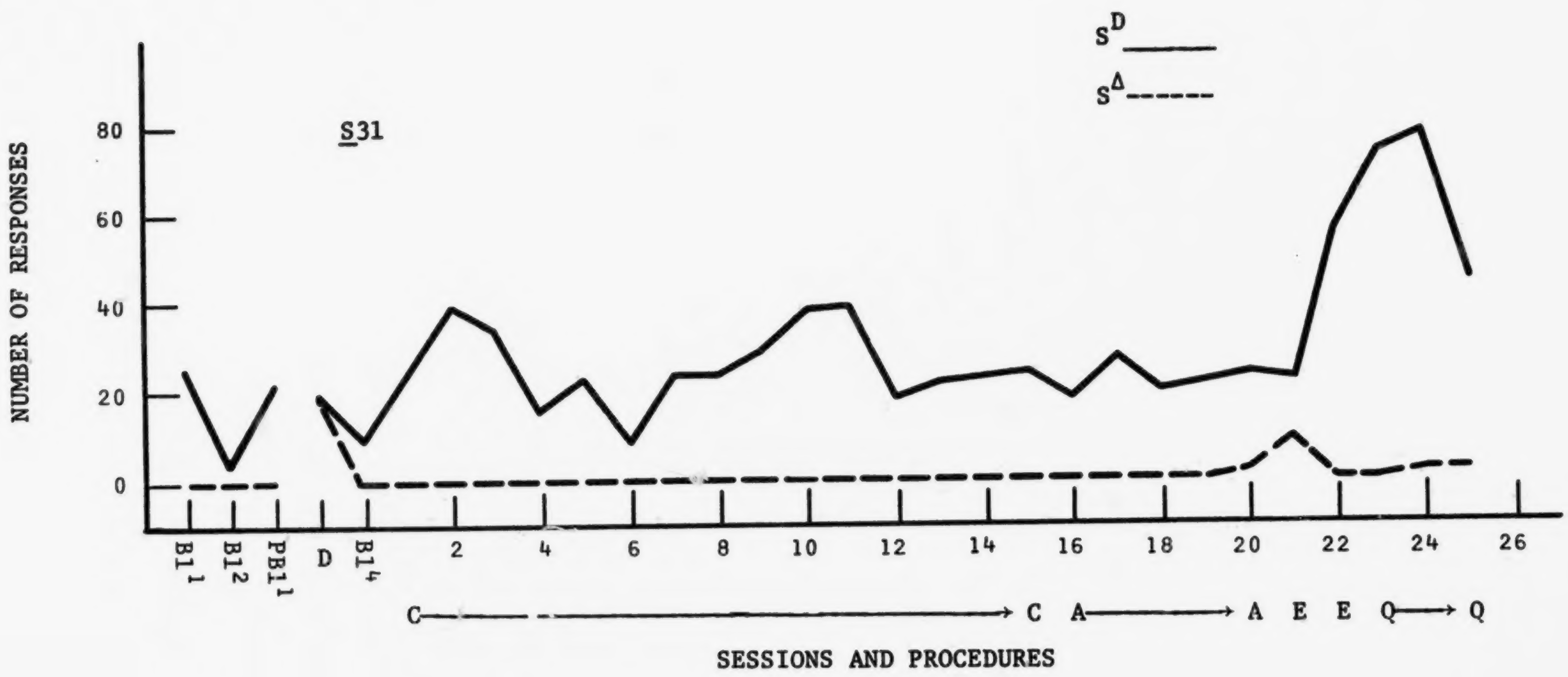


FIGURE 14

FIGURES 14 - 15. Frequency of Verbal Responding of S31 and S32 Over Baselines and Experimental Treatments.

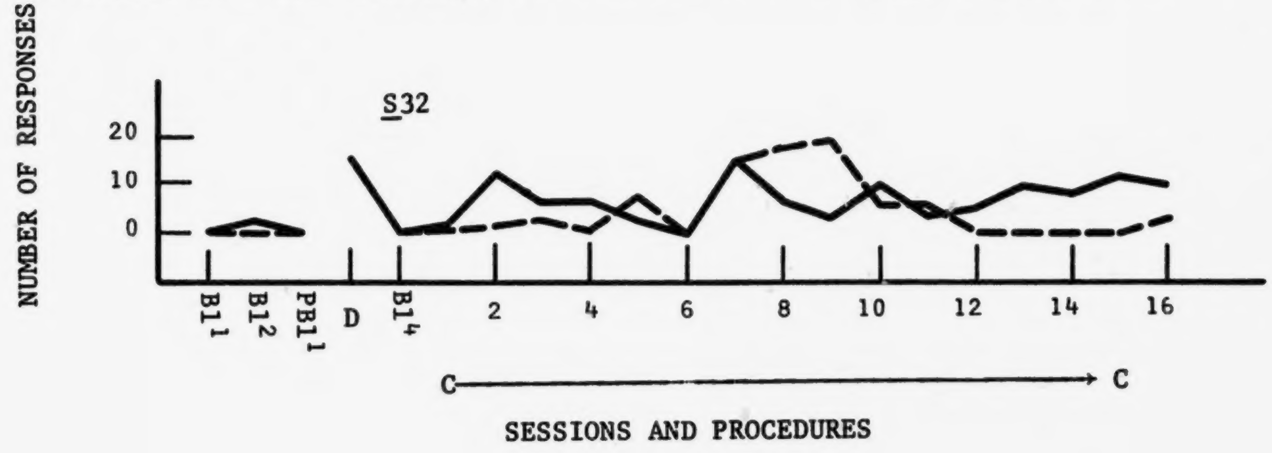


FIGURE 15

plus-single slide alternation procedure during Sessions 23 - 25. The addition of the prompts resulted in an increase of over twice the rate of S31's verbal output in previous sessions. It is interesting to note that very specific prompts (e.g., "Is the man standing or sitting?") were required to elicit speech from S31, as was the case for S11. More general prompts such as "tell me about this picture" were unsuccessful in eliciting speech from S11 or S31.

Throughout the sessions S31 improved in carrying out exchange transactions of points for money in the storekeeper situation and spoke appropriately to the E during these occasions. S31 rarely purchased anything from the E's store, preferring to keep the money that he earned. On two occasions he arrived at the experimental situation in an angry state; he refused to take the money that he earned during the experimental treatment. The E handled these situations by showing S31 that the money would be entered into S31's account, and he could receive this money the next time he came to work. The E also explained to S31 that the money rightfully belonged to him since he had earned the money during the session. This explanation seemed to satisfy S31, and he requested the money on the subsequent session, recalling the exact amount that was due him.

S32 was continued for Sessions 11 - 15 on the model-plus-reinforcement procedure. For Sessions 1 - 10, S32 had maintained a low steady rate of responding under both S^D and S^Δ conditions, making approximately the same number of responses for each condition. S32's verbalizations in the experimental sessions consisted of giggling and laughing sounds. Almost twice as many machine-recorded responses occurred during the S^Δ condition; S32 frequently responded nonsensically to the model's speech with lengthy giggling and laughing sounds. During the demonstration session, *S*32 had produced 15 responses, several of which were brief but appropriate "yes" or "no" responses to the *E*'s questions.

During Sessions 11 - 15, *S*32 maintained the low steady rate of responding while the S^D condition was in effect. *S*32's response frequencies during S^D were slightly higher for Sessions 11 - 15 than for Sessions 1 - 10 (see Figure 15). *S*32's frequency of responding to the S^Δ condition, however, decreased to zero by Session 12, and *S*32 continued to verbalize only under the S^D condition for the next three sessions. During baselines, *S*32 did not verbalize in S^Δ; the model's speech appeared to influence *S*32's verbalizations. *S*32 never spoke intelligibly about the slides. He was under reinforcement control during the experimental session, but did not transact money exchanges correctly in the storekeeper situation. Occasionally he asked for an item in the *E*'s store, but did not count out the correct amount of money requested by the *E*. Although *S*32's quality of speech did not appear to change over the time of the study, his frequency of verbal behavior increased from 0-1 response per baseline session to an average of 12 responses per session for Sessions 1 - 15.

*S*33 was continued for Sessions 11 - 15 on the *model-plus-reinforcement* procedure with the addition of *prompting via the headset*. *S*33 had emitted only three responses during Sessions 1 - 10, two of which were made under the S^Δ condition. Prompts were introduced at Session 11 with the expectation that *S*33's response frequency would increase. During the *demonstration* session, the *E* had elicited 49 responses from *S*33. The results of Sessions 11 - 15 indicated that the additional *prompting via the headset* had some effect on *S*33's verbal behavior; *S*33 produced a total of nine responses during these sessions (see Figure 16). Five of the nine responses were made under the S^Δ condition.

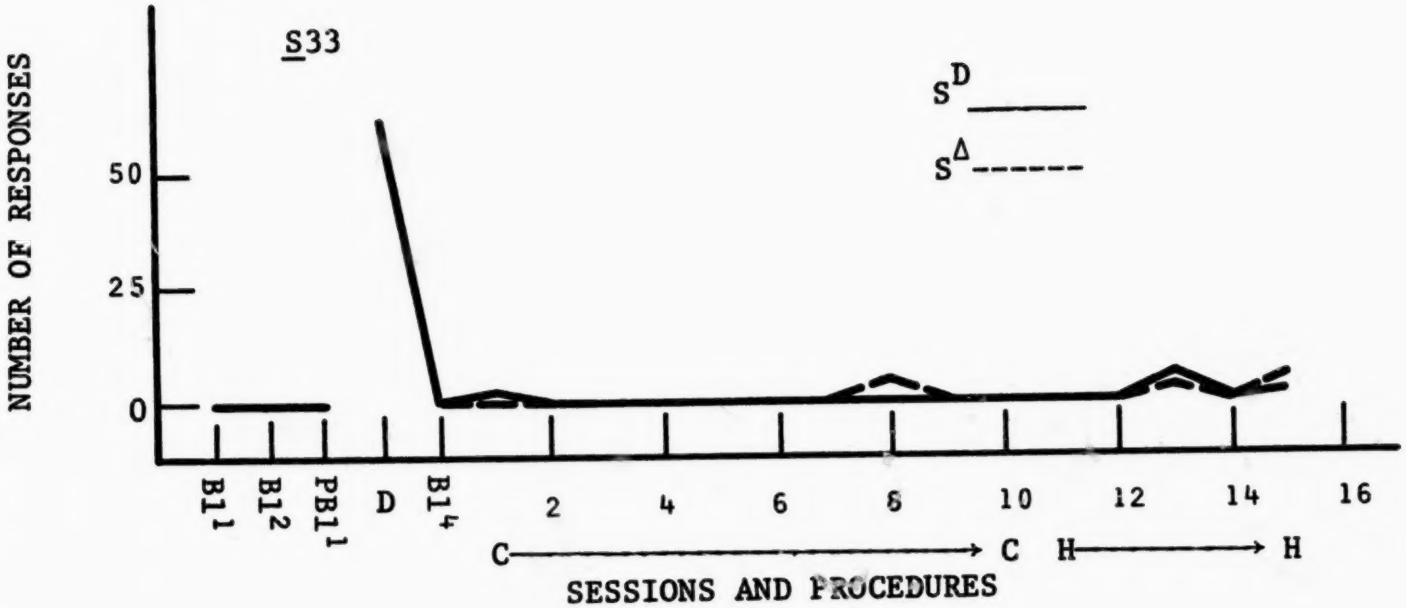


FIGURE 16. Frequency of Verbal Responding of S33 Over Baselines and Experimental Treatments.

S33 did not respond to the content of the slides, nor did he respond appropriately to the S^D and S^Δ conditions. He expressed a desire to receive candy and money when given instructions at the beginning of each session but usually replied "don't know about the talkin'." His speech during the experimental sessions consisted of several words, short phrases, and unintelligible verbalizations.

During the storekeeper situation, S33 did not carry out the appropriate exchange transactions with the E. S33 asked for candy several times in this situation, however, and also pointed to the items he wanted. Toward the end of the study, ward attendants noted that S33 had made drawings and had made a wallet; these activities were an improvement over his previously lethargic manner.

Group 4. S41 and S43 were continued on Group 4 conditions for Sessions 11 - 15; S42 continued under this treatment, but was also administered the additional procedure of prompting via the headset. S41 responded inconsistently at low to moderate rates over the first ten sessions. His speech consisted of giggles, unintelligible whispers, and sounds.

S41's rate of responding decreased slightly over Sessions 11 - 15, but he continued to respond in the same erratic pattern as during Sessions 1 - 10 (see Figure 17). S41 appeared under partial discriminative control of the slides with regard to his interactions with the model, but his garbled speech made any judgment of such a discrimination difficult to determine. He ate the candy and responded to the model's "good" and "mmmhmmm." His response to the model's social "reinforcements" was in agreement with findings of other investigators (e.g., Holz & Azrin, 1966).

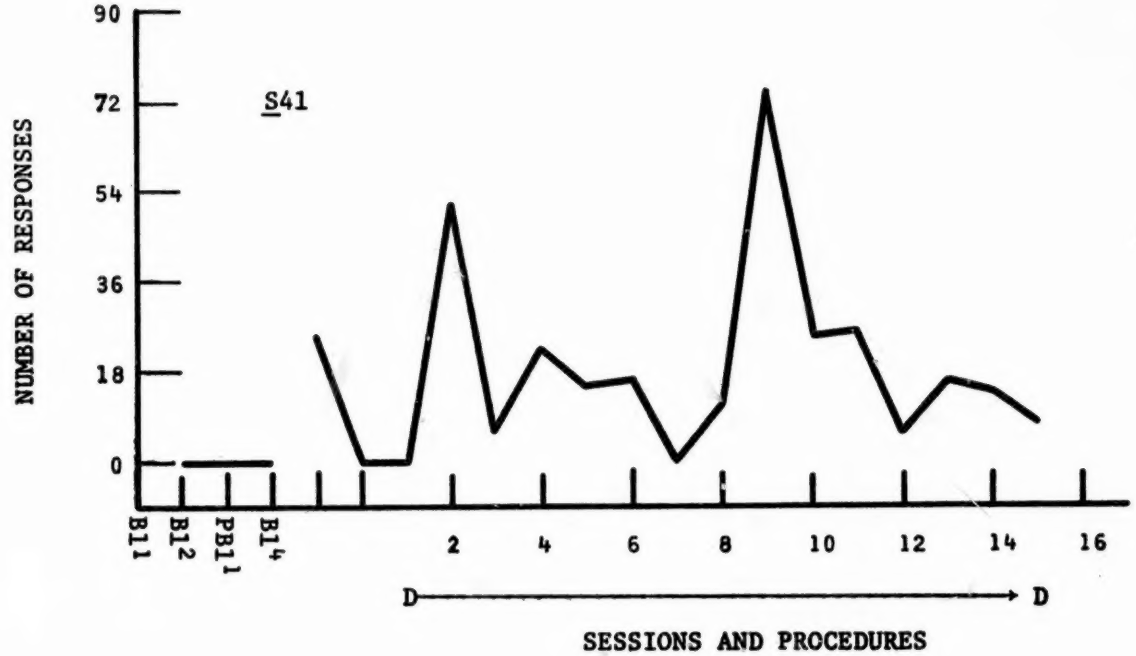


FIGURE 17

FIGURES 17 - 18. Frequency of Verbal Responding of S41 and S42 Over Baselines and Experimental Treatments.

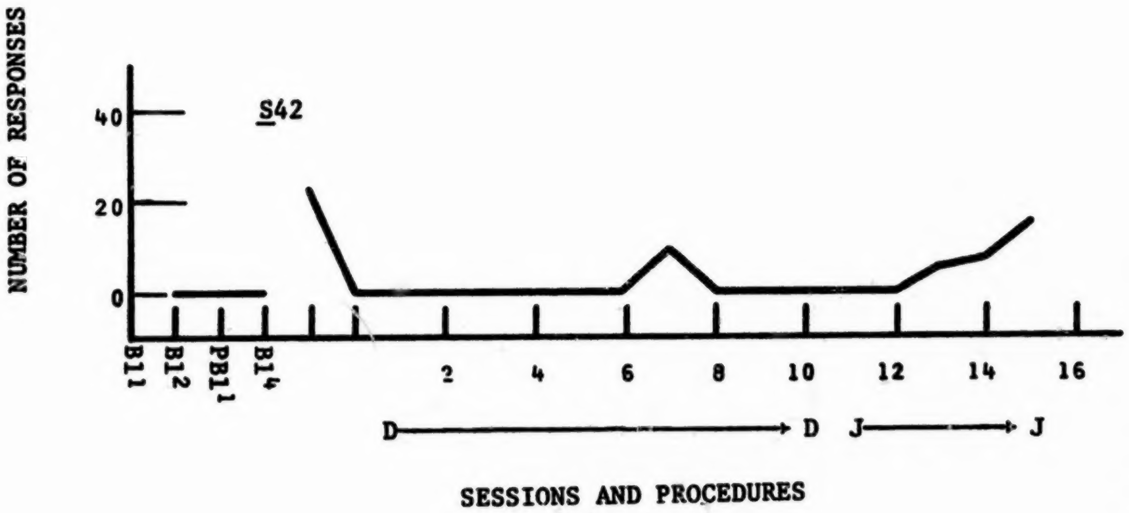


FIGURE 18

In the storekeeper situation, S41 did not carry out accurate money exchanges with the E. Toward the end of the study, he began to point more readily toward desired items while verbalizing, but his speech remained unintelligible. His average of 24 responses per session over Sessions 11 - 15 represented a significant increase over his baseline frequencies of zero.

S42 remained in Group 4 condition for Sessions 11 - 15 but also received the additional procedure of prompting via the headset. Over Sessions 1 - 10 S42 did not respond, with the exception of Session 7 during which he made nine responses. His speech consisted of giggling noises and sounds during Session 7. He had produced 22 responses during the demonstration session, and his baseline frequencies were zero.

S42 emitted a total of 28 responses during Sessions 11 - 15 (see Figure 18). This increase in responding over the previous sessions was characterized by S43's using words such as "yes" or "no" for the first time in the experimental session. During the storekeeper situation, S42 carried out the proper money exchanges with some prompting from the E. On one occasion S42 asked the E for a light for his cigarette; on two other occasions he responded to the E's greeting.

S43 was continued in Group 4 conditions for Sessions 11 - 15. S43 emitted a high but cyclical rate of responding over the first ten sessions. S43 spoke unintelligibly during the agitated states in which he responded at high rates. S43 did not appear to be under discriminative control of the slides; during agitated states he spoke in Polish constantly under both S^D and S^Δ conditions. By application of social reinforcers such as "good" or "mmhmmm," the E increased S43's rate of unintelligible verbalizations at will during S43's agitated states. When S43's rate of responding was high, he was shifted to an FR2 and FR3 schedule of reinforcement. He continued to respond at the same or higher rates with these changes.

During Sessions 11 - 15, S43 slightly decreased his rate of verbal behavior but maintained the same cyclical pattern of responding (see Figure 19). He consumed the reinforcers as rapidly as they were delivered. In the storekeeper situation he did not carry out exchange situations appropriately, though with considerable prompting from the E he exchanged his earnings for cigarettes and candy. S43 also kept much of the money he earned in the experimental situation. S43's rate of responding during the experimental sessions increased dramatically over his baseline frequencies, but his cyclical behavior made it difficult to determine the effect of the experimental procedures on his behavior.

The five Ss in the study who showed erratic and unstable rates of verbal behavior were S13, S22, S32, S41, and S43. Figures 20 - 24 show the characteristic patterns of verbal behavior for these Ss.

The alternation of the two models on successive experimental sessions did not result in any systematic effects caused by either model for any of the Ss. The Ss in Groups 2, 3, and 4 responded in their characteristic manners regardless of which model was present.

The data can also be viewed in terms of the Ss'rates of responding. The Ss'rates can be grouped according to low responders, moderate responders, or high responders (see Figure 25). Low responders made an average of ten or fewer responses per session, medium responders an average of 12 - 26 responses per session, and high responders an average of 50 or more responses per session. These

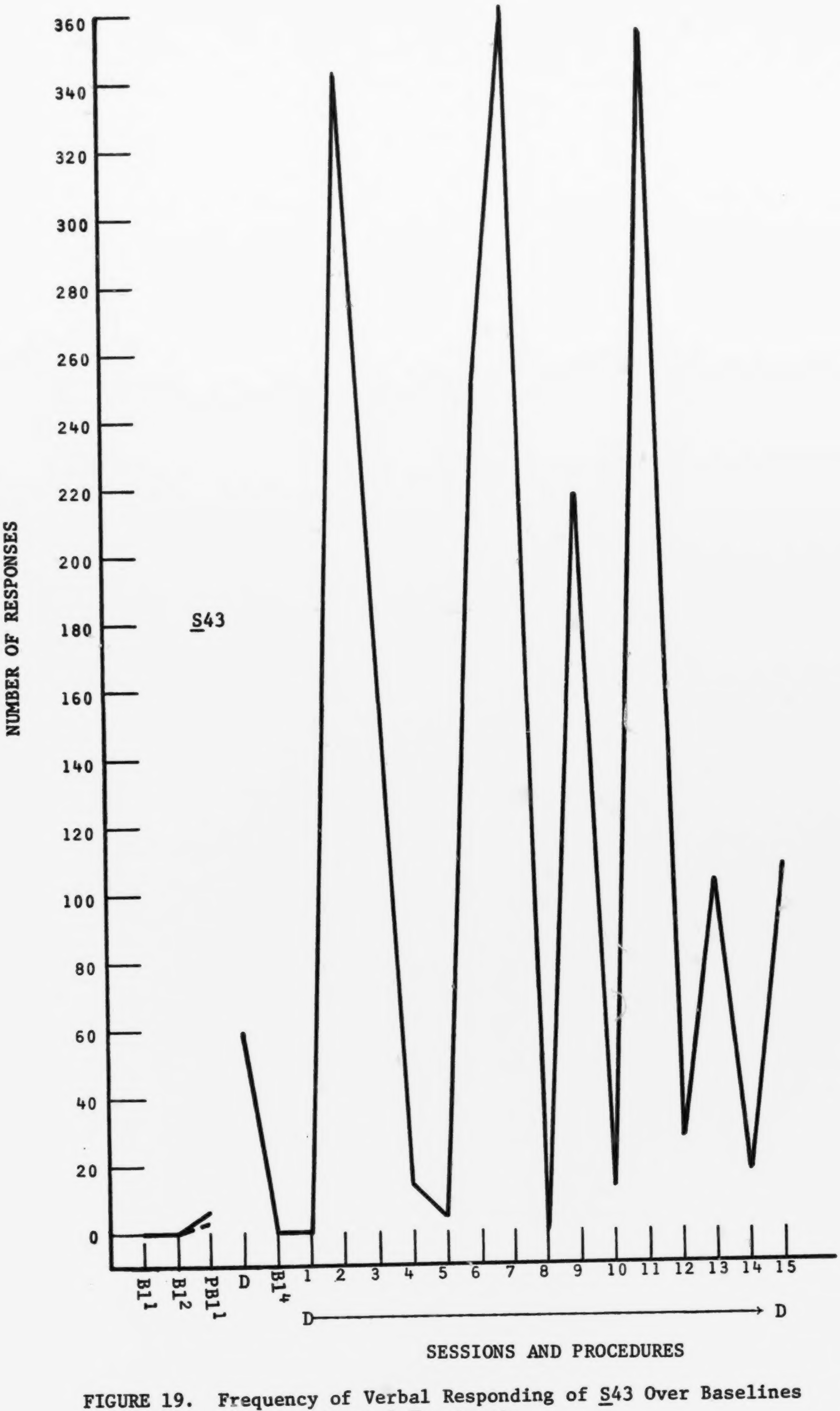


FIGURE 19. Frequency of Verbal Responding of S43 Over Baselines and Experimental Treatments.

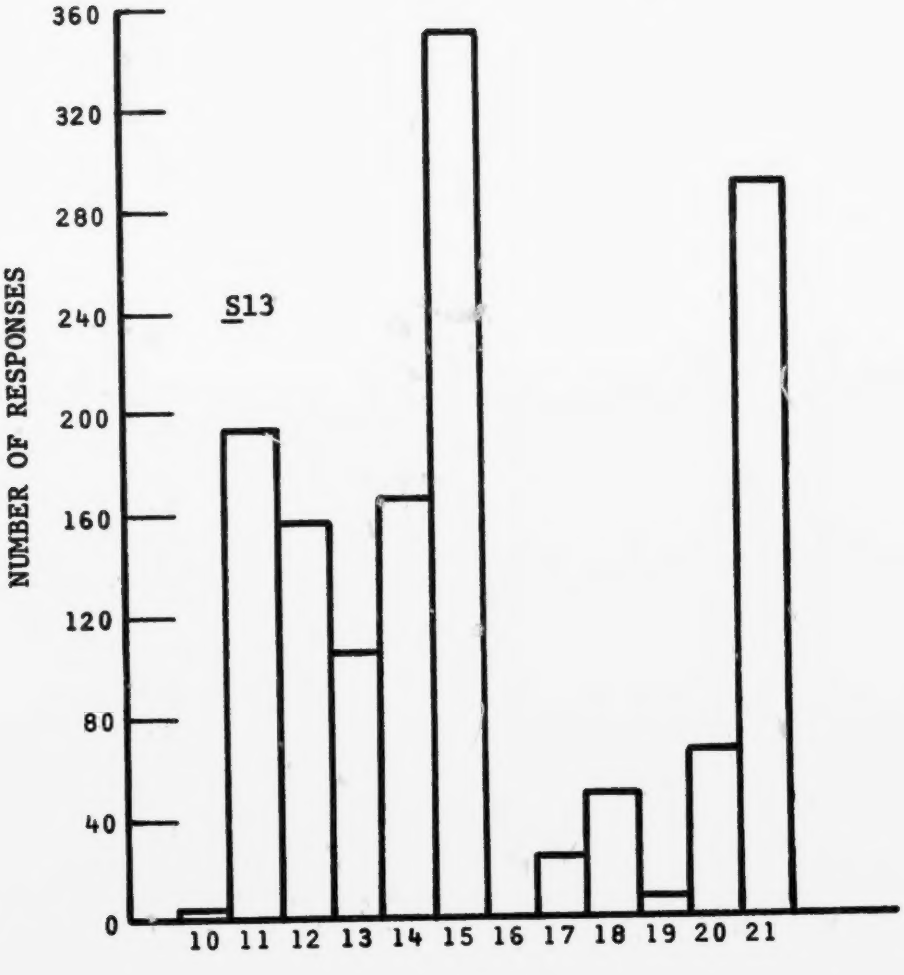


FIGURE 20

FIGURES 20 - 24. Erratic Rates of Verbal Responding Among Five Schizophrenic Ss.

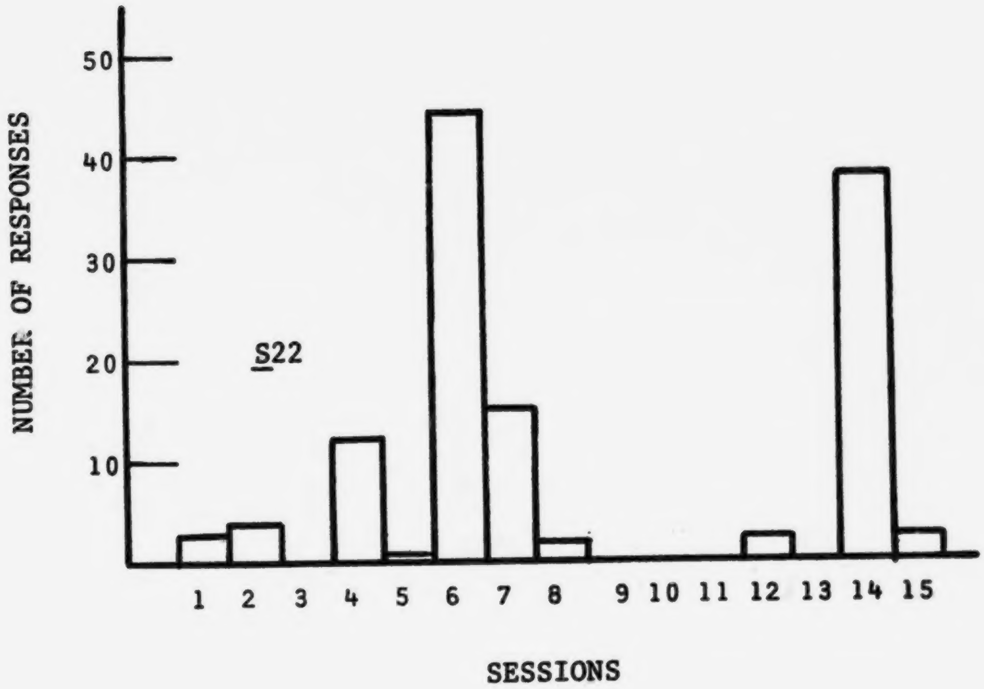


FIGURE 21

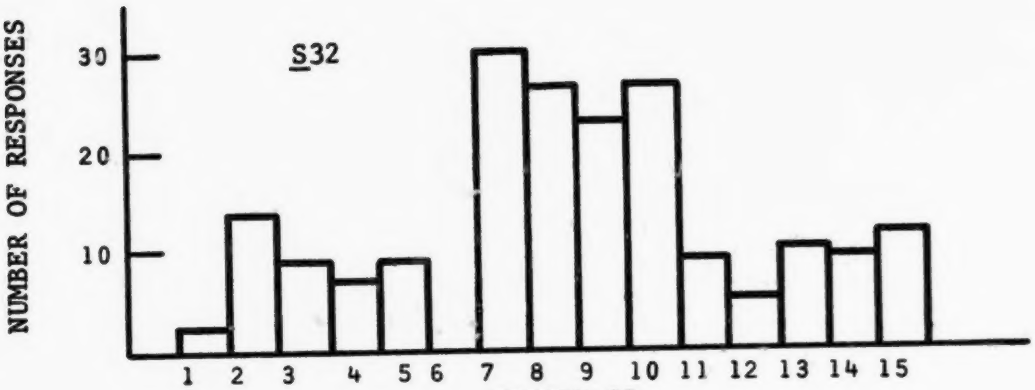


FIGURE 22

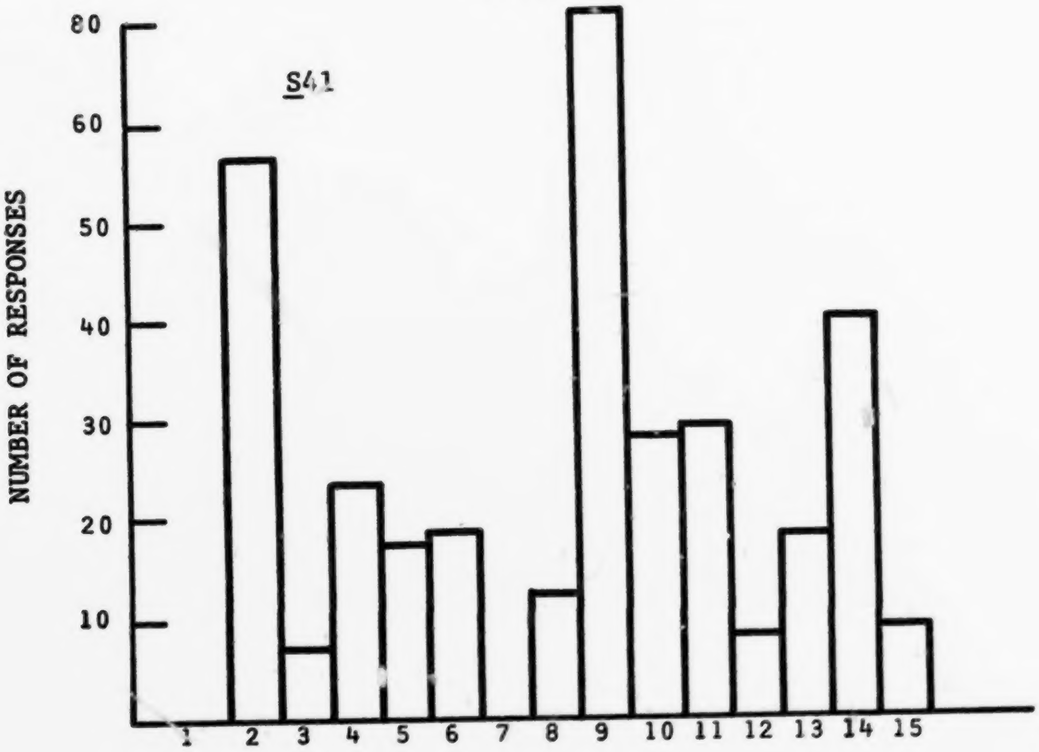


FIGURE 23

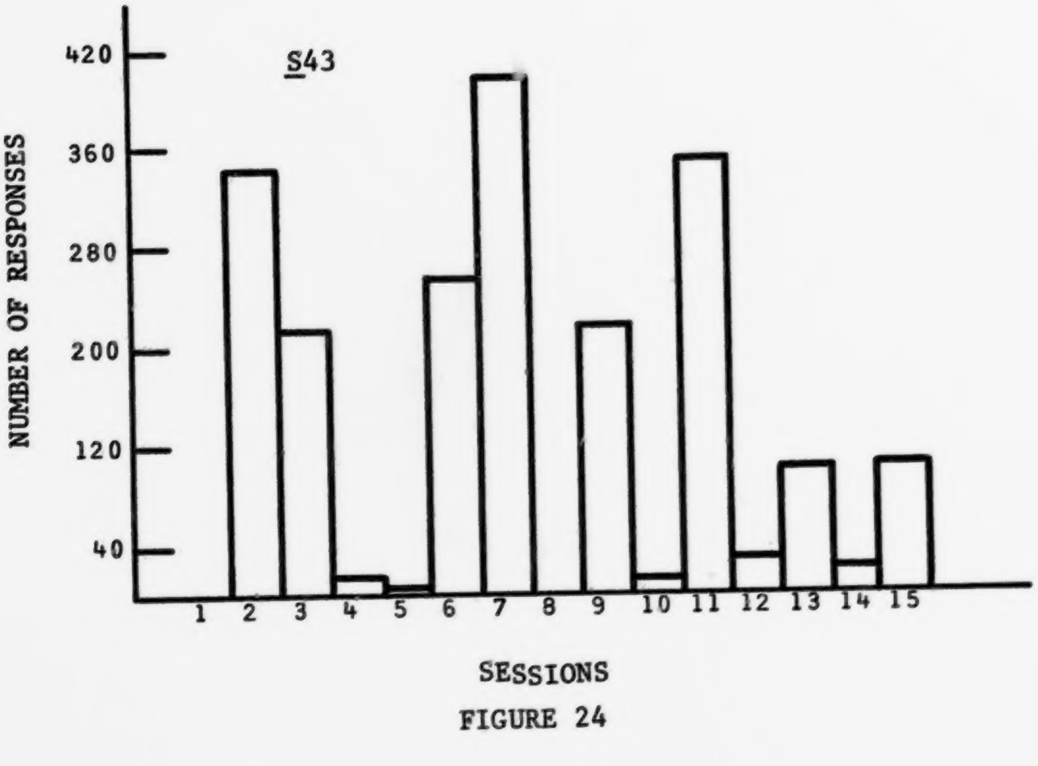


FIGURE 24

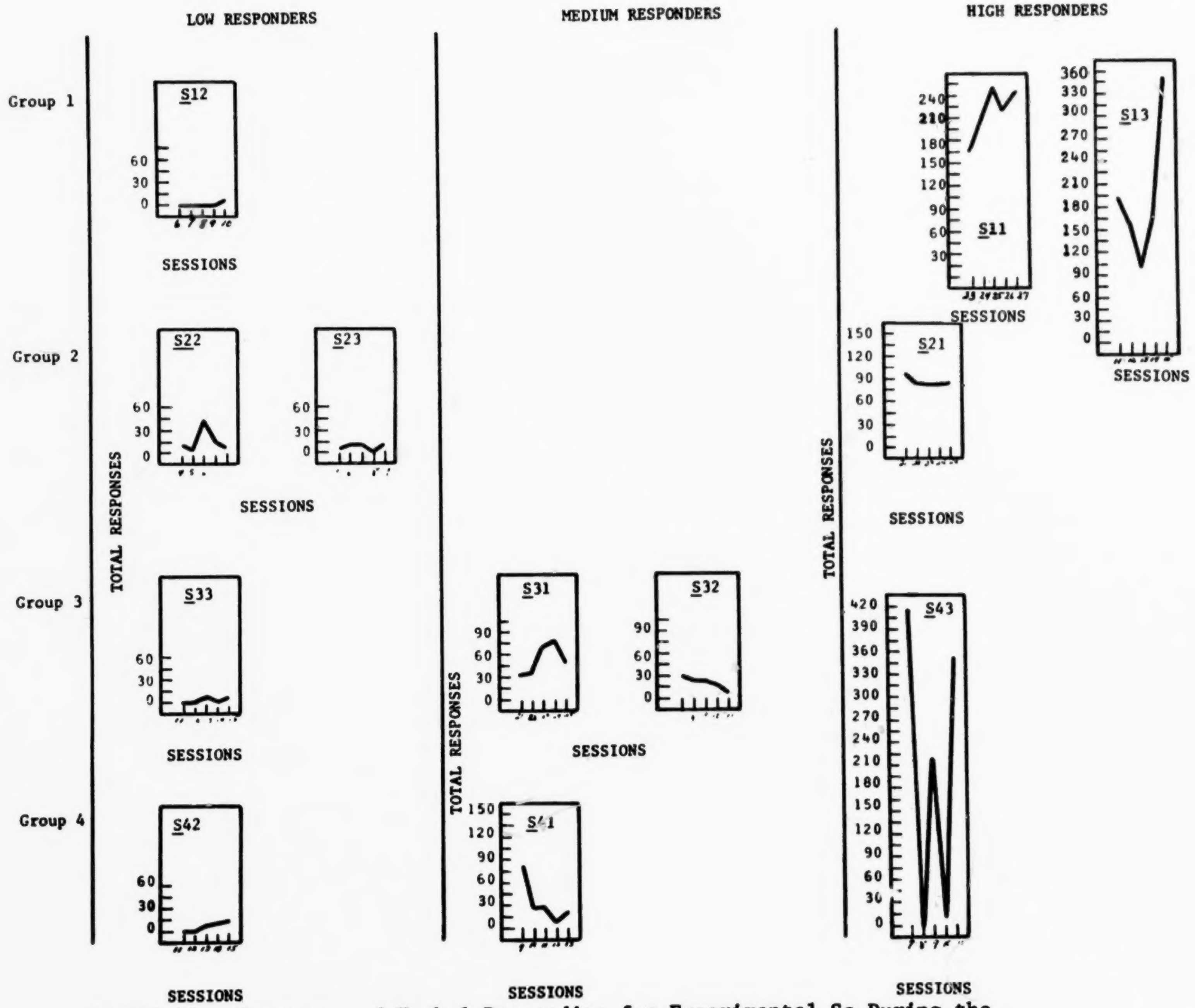


FIGURE 25. Frequency of Verbal Responding for Experimental Ss During the Five Highest Consecutive Sessions.

averages were taken for the five highest successive sessions of an S's verbalizations. The five low responders were S12, S22, S23, S33, and S42. The three moderate responders were S31, S32, and S41. The four high responders were S11, S13, and S21, and S43.

In summary, a total of 14 procedures were used with the experimental Ss. The four major procedures were used through Session 10, the three Ss in each of the four groups receiving the same procedure. The ten additional procedures were used following Session 10 with eight of the Ss. (Refer to Table 2 for the chart showing the procedures used with each S.)

Single slide alternation of S^D and S^{Δ}-plus-reinforcement was used with four Ss (S11, S13, S21, and S31). Ss showing an increase in verbal output over preceding sessions as a result of this procedure were S13, S21, and S31, although both S21 and S31 did not show greatly increased responding. S11 demonstrated no change in verbal output over previous sessions.

The model-only procedure with the addition of the pre-payoff condition was used with one S, S22. The S's pattern of responding remained at the same low rate under this additional procedure.

Reinforcement-plus-prompting via the headset was used with one S, S12. This procedure did not increase the S's verbal output during the sessions in which it was employed.

Model-plus-reinforcement-plus-prompting via the headset was used with one S, S33. This change in the experimental procedure from model-plus-reinforcement produced no changes in the S's verbal behavior in the experimental setting.

The model-plus-reinforcement-plus-social-reinforcement-plus-prompting via the headset was employed with one S, S42. Over the five sessions in which the procedure was used, the verbal output of *S*42 gradually increased to a level higher than it had been for any of the previous experimental sessions.

Elicitation with the E in the room-plus-single slide presentation of 80 seconds under S^D condition-plus-reinforcement was used for one session with *S*11. This procedure produced a dramatically high increase in the *S*'s verbal output over any of the previous sessions.

The procedure of *elicitation, E in the room, single slide alternation of S^D and S^Δ conditions-plus-reinforcement* was used with this same *S* (*S*11) for five sessions. The *S* continued to maintain the high rate of responding which he had produced in the previous session.

The above procedure was again modified so that it became *reinforcement-plus-prompting via the headset under S^D and S^Δ-plus-single slide alternation*. *S*11 continued to respond at a high rate. This procedure was also used with *S*13. Since *S*13 responded throughout the experimental sessions at varied rates, it is difficult to state a single conclusion concerning the five sessions during which the procedure was used with him. In general, however, he continued to respond in approximately the same erratic manner as he had in the previous six sessions (Sessions 11 - 16), although his rate of responding was slightly decreased.

A second modification of this procedure was employed for three sessions with *S*31. The procedure was *reinforcement-plus-prompting via the headset under S^D only with single slide alternation*. *S*31's frequency of responding increased over the previous sessions.

An *extinction* procedure was used with one *S* in the study, *S*21. Over the five extinction sessions, *S*21's rate of responding dropped below that of his previous experimental sessions.

Upon analyzing the results of the procedures used in the sessions following Session 10, certain conclusions can be made regarding those procedures which were best able to increase verbal output in the mute and near-mute schizophrenic Ss.

Five of the ten additional procedures had a positive effect on the S's rate of responding. Four of these procedures involved elicitation or prompting, plus reinforcement. The fifth procedure was a single slide alternation of S^D and S^Δ conditions-plus-reinforcement. This single slide alternation procedure was also used in three of the four other procedures. It is interesting that two Ss who received a prompting procedure without single slide alternation did not show any increases in verbal output. The single slide alternation procedure might have been useful in that it allowed the S time to organize his thoughts about individual slides before he verbalized about them, rather than having him wait until all the slides were shown once before the S^D condition occurred. The importance of reinforcement, which was used in all cases after Session 10 where Ss' rates increased, may be viewed from several standpoints. One is that reinforcement, in and of itself, brought about changes in behavior. On the other hand, it may also be that when reinforcement was combined with alternation, this situation helped the S to better discriminate the correct period in which to respond. Also, when reinforcement is delivered throughout the entire experimental session and not only during the last half of the session, the Ss have a greater interval over which to learn the procedure.

The results obtained with S11 show the importance of the interpersonal variable in verbal conditioning. Even with single slide alternation-plus-reinforcement this mute S maintained a zero rate of responding. With the addition of direct human interaction, first through *elicitation-plus-reinforcement* with the *E* in the room and later in the form of *prompting via the headset*, *S*11 developed a high rate of responding.

Results and Discussion of Extra-Laboratory Measures

Four extra-laboratory measures were taken on the ward to determine whether or not any increases in verbal behavior in the experimental setting generalized to the ward. These measures included a Magazine Pictures Test, an Observational Time Sampling Procedure, the Wilson-Walters Verbal Behavior Rating Sheet (1966), and the L-M Fergus-Falls Behavior Rating Sheet (1951). The measures were administered prior to an *S*'s first experimental session and were again taken after his tenth experimental session. Measures for control *Ss* were taken during the same intervals as for experimental *Ss*.

Two five-minute time sampling observations were taken of the *Ss*' verbal behavior on the ward during pre-test and post-test measures. Table 4 shows a pre-test and post-test sample of the *Ss*' verbal productivity on the ward as observed during the Observational Time Sampling Procedure. The table indicates that one *S* increased in verbal productivity over the pre-test session, four *Ss* decreased in verbal productivity; the remaining seven experimental *Ss* showed no changes in verbal behavior over the ten experimental sessions. The results did not indicate any systematic relationship with the *Ss*' rates of verbal output during the experimental treatments. Control *Ss* also failed to show any systematic relationship between their scores on the time sampling measures and their performances in the experimental situation. Thus, on this measure there was no generalization of the *Ss*' verbal behavior from the experimental setting to the ward.

TABLE 4

Verbal Productivity of Schizophrenic Ss During Observational Time Sampling Procedure (Number of Total Responses)

	Pre-Test					Post-Test					
	Seconds of Verbal Productivity										
	Day		Evening		Total	Day		Evening		Total	Change
Group 1											
S11	0	+	0	=	0	0	+	0	=	0	0
S12	0	+	0	=	0	0	+	0	=	0	0
S13	0	+	30	=	30	18	+	2	=	20	-10
Group 2											
S21	0	+	3	=	3	0	+	0	=	0	- 3
S22	4	+	18	=	22	48	+	14	=	62	+40
S23	0	+	0	=	0	0	+	0	=	0	0
Group 3											
S31	0	+	6	=	6	0	+	0	=	0	- 6
S32	0	+	8	=	8	0	+	0	=	0	- 8
S33	0	+	0	=	0	0	+	0	=	0	0
Group 4											
S41	0	+	0	=	0	0	+	0	=	0	0
S42	0	+	0	=	0	0	+	0	=	0	0
S43	0	+	0	=	0	0	+	0	=	0	0
Control											
S51	0	+	0	=	0	0	+	0	=	0	0
S52	0	+	0	=	0	0	+	0	=	0	0
S53	0	+	0	=	0	0	+	0	=	0	0
Control											
S61	0	+	0	=	0	0	+	0	=	0	0
S62	0	+	28	=	28	0	+	4	=	4	-22
S63	3	+	0	=	3	3	+	0	=	3	0

If observational measures could have been taken of Ss after they had completed additional treatment sessions (i.e., those conducted after experimental Session 10), their behavior on the ward might have indicated increased verbal behavior on the ward. Also, more frequent or longer time sampling periods might have shown different results.

The second measure of the Ss' verbal behavior in the ward setting was the Magazine Pictures Test. Table 5 indicates that four Ss increased in verbal responding over the pre-test--post-test period, four Ss decreased in responding, and four Ss did not indicate any changes in responding. The table does not indicate any systematic relationships between an S's frequency of responding in the experimental situation and his changes in verbal output over the pre-test--post-test measures of the Magazine Pictures Test. There were no consistent changes in verbal output for Ss in the different groups, although Ss in Group 1 showed either no changes or decreases in verbal behavior. Two Ss in Group 2 showed increases in responding to the magazine pictures; these Ss had also increased in frequency of responding during the experimental sessions, as compared with their baseline frequencies. The data for Ss in Group 3 did not correspond to the behavior of these Ss in the verbal conditioning situation. In Group 4, one S showed an increase in frequency of responding who had also increased his frequency of responding during the verbal conditioning situation; the other two Ss did not show any change in frequency of responding to the magazine pictures. Ss in the two control groups showed no decreases or decreases in frequency of responding over the two magazine pictures sessions.

A comparison between the results of the Observational Time Sampling procedure and those of the Magazine Pictures Test procedure reflects the more functional aspect of the procedure for the Magazine Pictures Test

TABLE 5

Verbal Productivity of Schizophrenic Ss During Magazine Pictures Test Procedure (Number of Total Responses)

	Pre	Post	Change
S11	30	19	- 11
S12	0	0	0
S13	39	25	- 14
S21	40	60	+ 20
S22	5	5	0
S23	7	33	+ 26
S31	79	27	- 52
S32	38	31	- 7
S33	21	27	+ 6
S41	0	13	+ 13
S42	0	0	0
S43	*	*	*
S51	1	1	0
S52	0	0	0
S53	28	27	- 1
S61	391	214	-177
S62	275	1	-274
S63	52	34	- 18

*S mumbled unintelligibly throughout the entire session.

in producing verbal behavior. The Observational Time Sampling procedure was similar to situations in which an S is described as mute by hospital personnel, in that periodic observations are made of the Ss' behavior and Ss who emit minimal verbal behavior are judged as mute or near-mute by hospital staff. In both pre-test and post-test measures of the Magazine Pictures Test, however, it was clearly indicated that verbal behavior could be elicited from most of the Ss in the study. The Magazine Pictures procedure was similar to the experimental procedures in which a model was used in that many Ss under the model conditions spoke more under S^{Δ} than under S^{D} conditions, thus indicating that the Ss were responding to the verbal behavior of the model in the same manner as they responded to the direct elicitation procedure conducted by the E. The Magazine Pictures Test is also similar to the elicitation procedures used by the E in the demonstration procedure and during the prompting procedure, both with the E in the room as well as via the headset.

Comparisons of the results of the Magazine Pictures Test with those of the Observational Time Sampling procedure also indicated that the Ss had verbal behavior in their repertoires, though these behaviors varied in content and in frequency of occurrence. Furthermore, such verbal behavior was elicited through elicitation and prompting procedures. The verbal output of S11, for example, increased dramatically with application of elicitation and prompting procedures. The interpersonal aspect of the elicitation and prompting procedure is illustrated by S33, whose verbal behavior increased during the demonstration session but showed minimal change with model-plus-reinforcement-plus-prompting via the headset. The Magazine Pictures Test data, as well as the demonstration data, also indicated that control Ss were comparable to experimentals in that verbal behavior could be elicited from them.

Two ward measures were filled out by attendants to describe the Ss' behavior on the ward. The Wilson-Walters Verbal Behavior Rating Sheet (1966) was used to assess the extent of verbalization of the Ss on the ward, and to determine whether or not the Ss' verbal behavior generalized from the verbal conditioning situation to the ward.

The results of the Wilson-Walters test did not indicate any systematic relationship between the Ss' rates of verbal behavior in the experimental situation and those on the ward. The data also did not indicate any systematic increases or decreases in the Ss rates of verbal behavior over the pre-test measures. However, the ratings proved unreliable; several of the six raters often rated the same patient on opposite extremes of the scale. For example, one rater indicated that an S increased his score a total of 16 units on the rating scale over the pre-test measures, whereas a second attendant rated the same Ss as having decreased 24 units. The lack of rater reliability precludes serious consideration of the data. Further, control Ss showed greater increases in verbal output than did the experimental Ss. Thus, it is difficult to draw any conclusions about the Ss' increased or decreased verbal behavior on the ward on the basis of these data.

The second ward rating instrument was the L-M Fergus-Falls Behavior Rating Sheet. The Fergus-Falls Behavior Rating Sheet was developed by Lucero and Meyer (1951), and has been found useful in the diagnosis of patients in situations where it was not feasible to obtain more direct measures (e.g., Lindsley, 1956). The Fergus-Falls instrument consists of 11 items, each denoting a different area of behavior (e.g., eating at mealtimes). The items are rated on a five-point scale indicating the extent of appropriate behavior for an S in a given area.

The Ss were rated by four attendants on one ward and by three attendants on the second ward. On the first ward, two attendants rated the Ss on the pre-test measures. On the pre-test measure Ss were rated by the attendants to determine whether or not there was a relationship between their scores on the Fergus-Falls test and their conditionability in the verbal conditioning situation. Lindsley (1956) found a correlation of .81 between these ratings on ward behavior and the Ss' rates of operant responding on a bar press. Lindsley found that patients who were rated most disturbed had the lowest rates of responding, with long inter-response times and many pauses, whereas those rated as least disturbed indicated higher rates of responding and fewer pauses. Mednick and Lindsley (1958) interpreted these findings as evidence that patients who responded at higher rates had greater sensitivity to the reinforcements in their social environment and were thus more capable of learning to manipulate the environment to obtain reinforcements. The results of the present study, however, indicated that there were no systematic relationships between an S's score on the Fergus-Falls Behavior Rating Sheet and his subsequent performance in the verbal conditioning situation. The two Ss who scored highest on the instrument, however, responded with the most discriminative control in the verbal conditioning situation at moderate or high rates of verbal behavior (S21, S31). The data indicated that the two Ss who scored lowest on the Fergus-Falls instrument also performed poorly during the verbal conditioning situation (S12, S13). On the other hand, some Ss received high scores and responded at low rates in the verbal conditioning situation, or vice versa. The reliability between raters was poor in that some Ss were marked at one point of the scale by one rater and at a directly opposite point of the scale by a second rater. The total scores of an individual S's behavior made by different raters varied considerably. The rater reliability was highest for the two Ss rated lowest on the instrument.

The Fergus-Falls Behavior Rating Sheet was also used to determine whether or not the Ss' changes in verbal output in the experimental setting would result in improved behavior ratings on the ward. Analysis of these data indicate no systematic changes in the Ss' behavior from the pre-test to the post-test measures. Again, attendants varied considerably in their ratings of individual Ss. Thus, in summary, the lack of rater reliability on this instrument precludes serious consideration of the data.

One item on the L-M Fergus-Falls Behavior Rating Sheet assessed the verbal behavior of an S; ratings made by attendants on this item could be compared with their ratings of Ss on the Wilson-Walters item. This comparison indicated low intra-judge reliability between a rater's assessment of an S's verbal behavior on one instrument with his rating of the S's verbal behavior on the second instrument. It is interesting that the attendants' ratings of the Ss' verbal behavior on the Fergus-Falls instrument were more consistent than were the overall ratings they made on either the Wilson-Walters or Fergus-Falls tests as a whole.

Summary and conclusions. Analysis of the data on each of the four extra-laboratory measures did not indicate any systematic relationships with the Ss' laboratory behavior. The results of the Observational Time Sampling procedure and those of the Magazine Pictures procedure did not indicate generalization of the Ss' verbalizations from the laboratory to the ward. The lack of rater reliability on the Wilson-Walters Verbal

Behavior Rating Sheet and the L-M Fergus-Falls Behavior Rating Sheet precluded serious consideration of these data.

It was mentioned earlier that the goal of this study was to increase the frequency of the Ss' verbalizations in the laboratory setting. The purpose of the extra-laboratory measures was to detect whether or not changes produced in the laboratory generalized to the ward, rather than prove that such generalization should occur. It would appear, as Wilson and Walters (1966) have indicated, that in order for generalization to occur, a treatment design which structures successive approximations to the desired behavior might be more productive.

Results and Discussion of the Lever-Pull Experiment

The lever-pull experiment was conducted for several purposes; the first was to test whether Ss could transfer the discrimination acquired in the verbal conditioning experiment to a situation involving a motor response. In both situations a red light served as the discriminative stimulus (S^D) under which the specified verbal response or motor response was followed by reinforcement. The second purpose of the lever-pull experiment was to train the Ss on a lever-pull task, regardless of whether or not they had shown conditionability in the verbal conditioning situation. The third purpose of the lever-pull experiment was to determine whether or not M&M's served as reinforcers for an S, as this had not been determined in the verbal conditioning experiment.

Table 6 shows the percentage of total responses made by the four Ss (S11, S13, S21, S31) under S^D and S^Δ conditions during the verbal conditioning experiment and the lever-pull experiment. The table indicates that the Ss emitted motor responses at a much higher rate than they did verbal responses. The second important finding was

TABLE 6

Percentage of Total Responses for Four Schizophrenic Ss Under S^D and S^Δ Conditions During Verbal Conditioning and Motor Conditioning

	VERBAL		MOTOR	
	% Responses		% Responses	
	S^D	S^Δ	S^D	S^Δ
S11	46% (N=973)	54% (N=1138)	54% (N=4692)	46% (N=4063)
S13	55% (N=772)	45% (N=631)	44% (N=1101)	56% (N=1403)
S21	95% (N=1991)	5% (N=102)	92% (N=2024)	8% (N=172)
S31	98% (N=749)	2% (N=15)	94% (N=4414)	6% (N=240)

N = Total number of responses for S^D or S^Δ condition.

that the two Ss (S21 and S31) who had formed appropriate discriminations in the verbal conditioning situation responded similarly in the lever-pull experiment; the two Ss (S11 and S13) who had failed to form the discrimination in the verbal conditioning experiment behaved similarly in the lever-pull experiment. On the whole, Ss behaved in strikingly similar ways in both experiments. The similar response characteristics included latency of responding to the discriminative stimulus, formation of the appropriate discrimination to the onset and absence of the red light, and the pattern of responses during experimental sessions.

For two of the Ss (S11, S31), the E sat next to the Ss in the experimental room during several of the sessions, in one case to facilitate S11's execution of the lever-pull response and formation of the appropriate discrimination, and in the other case to accelerate S31's rate of responding. The first S (S11) had frequently failed to pull the lever out far enough to trigger the response mechanism; this resulted in frequent occasions in which S pulled the lever consistently but did not receive reinforcement. At the beginning of the second and third sessions, the E reminded S11 to pull the lever out all the way, but these instructions failed to alter the S's response. Several times during these sessions, the E interrupted the session, briefly entering the experimental room and again instructing the S to pull the lever all the way out. These instructions resulted in the S executing the proper response several times, after which he returned to his previous manner of responding. For the sixth session, one of the Es sat next to the S. The S was reminded to pull the lever all the way out and was again told that the more he pulled the lever when the red light was on, the more money he would earn. For the first ten trials of the sixth session, the E did not give any instructions, and S11 responded in his characteristic manner. The E then said "Good" each time the S pulled the lever out all the way when the light was on, and continued these instructions for ten trials under this condition. Following the desired response with "Good" did not alter the S's response pattern. For the remainder of the sixth session the E continued to say "Good" when the S performed the appropriate response, but also said "No good" when the S failed to pull the lever out far enough. No change was observed in S11's behavior under these conditions. Preliminary instructions were repeated to the S at the beginning of the seventh session, and ten trials were conducted with no further instructions given by the E. The E then gave the instructions, "Pull the lever all the way out," "All the way out," and "All the way." The S's response pattern changed dramatically with these instructions, as shown in Figure 26. The E alternated S^D periods of giving instructions and not giving instructions for the remainder of the session. These instructions were continued during the eighth and ninth sessions, and the S's rate of lever-pulling sharply increased.

The first ten trials of the eighth and ninth sessions were treated as baselines under which no instructions were given. For the eighth session, the E attempted to also decrease S11's rate of responding during S^Δ. Interestingly enough, when the S was asked when he was supposed to pull the lever, he replied appropriately, "When the light is on"; yet his lever-pulling behavior was not under appropriate S^D control.

During the eighth session, the S was told to remove his hand from the lever when the light was off (S^Δ). When the S pulled the lever during S^Δ, the E said, "Stop, the light is off." The S stopped responding at this time and removed his hand from the lever, his leg twitching rapidly until the light came on, whereby he immediately started responding. The E alternated periods of instructions and no

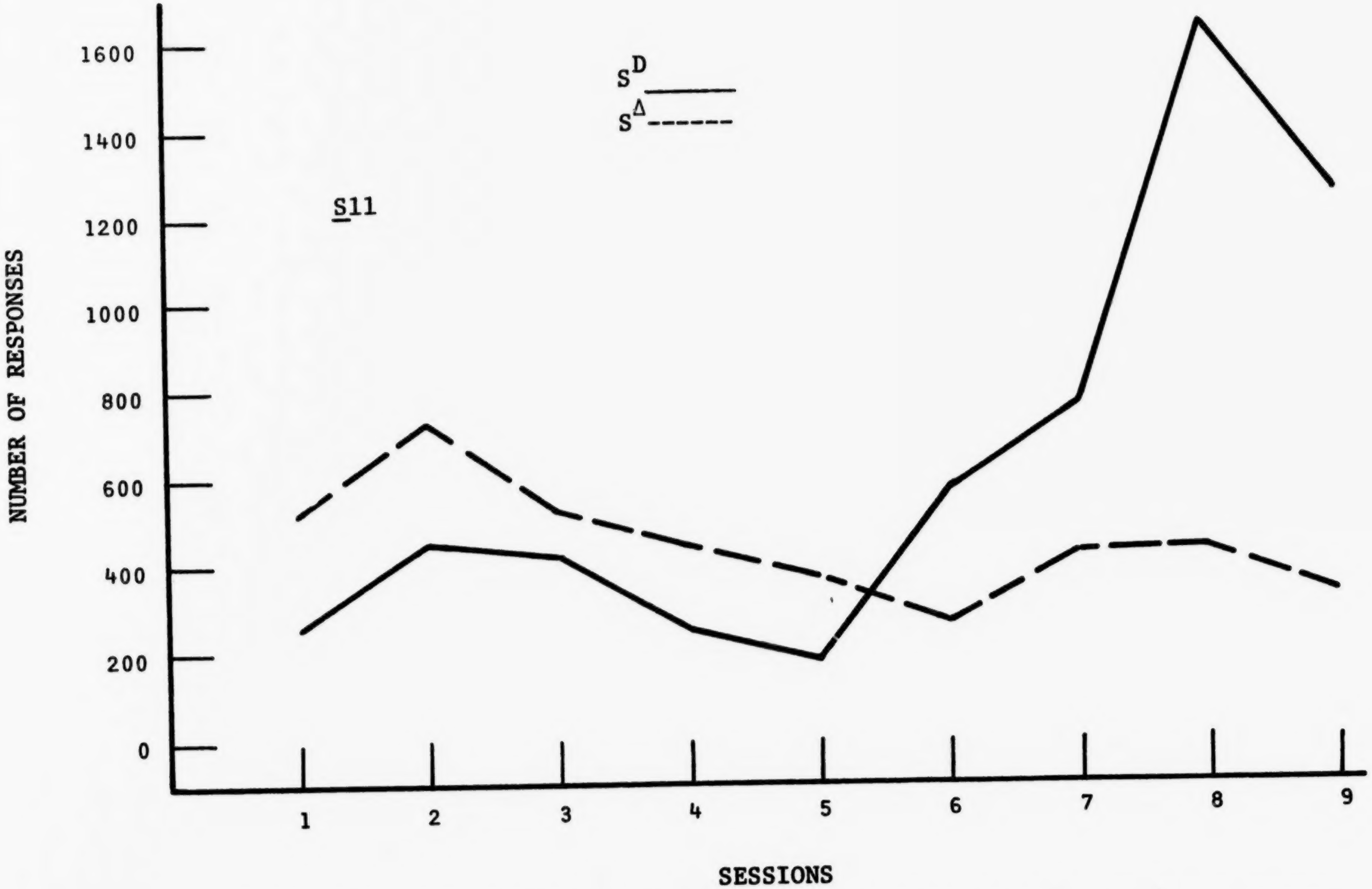


FIGURE 26. Frequency of Lever-Pull Responses of S11 During S^D and S^Δ Conditions.

instructions when the light was off; differential effects were observed, the instructions serving to decrease markedly the frequency of inappropriate responding, while no instructions allowed the S to respond in his characteristic pattern.

During the latter part of Session 8, the E attempted to fade out the verbal instructions by saying, "The light is off," "Light's off," and "Off." Under these instructions, S11 refrained from responding when the light was off, as shown in Figure 26. Finally, the E placed his finger on the bulb, indicated to the S that the "light's off," and repeated this action several times. The E then placed his finger on the bulb but did not give the verbal instructions. On one occasion, the S responded to the E's finger response by placing his own finger on the bulb and rubbing it. This response occurred immediately prior to the scheduled onset of the light and established an accidental contingency between the S's response and the onset of the light. The S repeated the response on the next trial, persistently rubbing the bulb until the 15-second S^{Δ} interval elapsed and the light came on. During the next period of S^{Δ}, the E interrupted the S's rubbing response, telling him this would not illuminate the bulb; the S was told to remove his hand from the bulb during this period and wait for the light to come on. S11 refrained from rubbing the bulb and stopped pulling the lever when the E pointed to the bulb. Occasionally, the E had to add the words "Off" before the S stopped responding. This procedure was continued during Session 9. The S continued to perform the appropriate lever-pull response and to refrain from pulling the lever during S^{Δ} only when the E gave instructions; otherwise he lapsed into his previous response patterns, perseverating on the lever-pull response under both stimulus conditions and decreasing his frequency of appropriate executions of the lever-pull response.

In summary, S11 received nine sessions of training on the lever-pull task. S11 responded consistently throughout the first session during both S^D and S^Δ conditions, but frequently did not pull the lever out far enough to activate the response mechanism. During the second and third sessions, the E's instructions at the beginning and during the middle of the sessions resulted in a slight but temporary improvement in S11's responding. The S continued to respond inappropriately during Sessions 4 - 5 under no instructions. In Session 6, the E said "Good" when S11 was reinforced for pulling the lever properly; no increase in the proper response was observed, even if the E also said, "No good" when S11 responded inappropriately. During Session 7, more specific instructions such as "Pull the lever all the way" were given by the E, and the S's rate of responding sharply increased. The E continued this procedure during Session 8, also giving instructions such as "Stop" when S11 responded during S^Δ; S11 pulled the lever properly and stopped responding to S^Δ while under these instructions. S11 responded appropriately at high rates during S^D on Sessions 8 - 9 as long as the E gave specific instructions.

The second S (S31) that the E sat next to in the experimental room transferred the proper discrimination from the verbal conditioning situation to the lever-pull experiment; S31 made less than ten per cent of his total responses during the S^Δ period over the first three sessions, and less than five per cent of such responses over the next four sessions. Figure 27 shows S31's low frequency of responding during the S^Δ condition. In both experiments, S31's patterns of responding in the presence of S^D and S^Δ were similar. (Compare Figure 27 with S31's verbal conditioning graph in Figure 14.)

During the verbal conditioning experiment, S31 responded in short bursts immediately after he perceived the onset of the red light, and

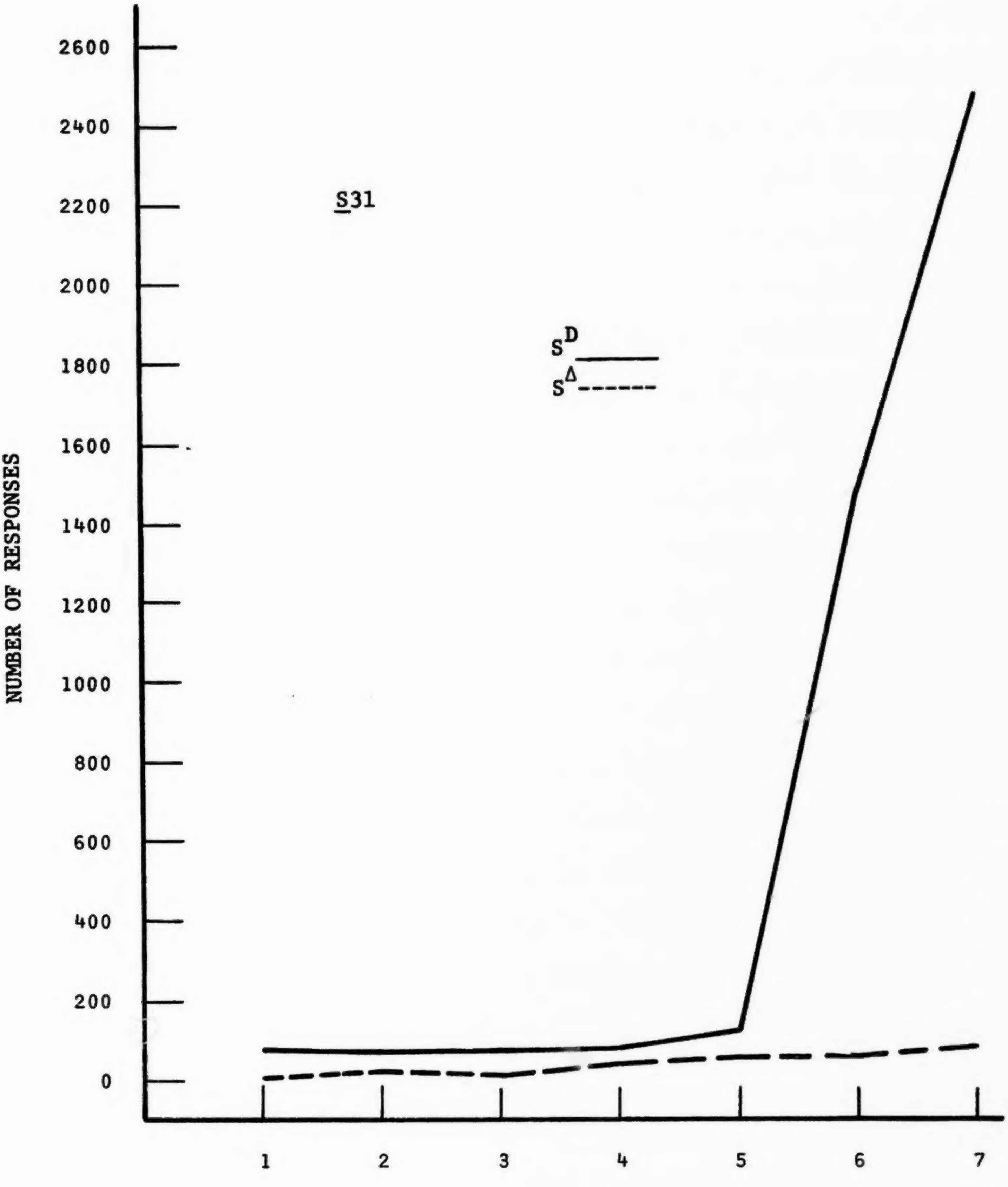


FIGURE 27. Frequency of Lever-Pull Responses of S31 During S^D and S^Δ Conditions.

then abruptly stopped speaking for the remainder of the S^D interval. In the lever-pull situation, the S's manner of responding was strikingly similar; he pulled the lever immediately after he perceived the onset of the red light, but only in short bursts lasting several seconds.

At the beginning of Session 5, the E instructed S31 to pull the lever more frequently and faster. These instructions resulted in a temporary increase in his responding which rapidly diminished to its previous rate. His rate of responding remained fairly consistent over the first five sessions (77 - 109 responses per session), as shown in Figure 27.

During Session 6, the E sat next to S31, but did not give any instructions for the first ten trials. Specific instructions were given thereafter during S^D. The E started with "Good," but this did not appear to increase the S's responding. The words "keep pulling," "keep on going," "that's it," or "the more you pull, the more you get," were emitted by the E during the early bursts of S31's responding to the onset of the red light. These words maintained the S's responding for rapidly increasing periods, until after several trials S31 began to respond over the entire interval. The E told S31 to watch the bulb closely so that he could respond to it immediately after it appeared, thus enabling him to respond more frequently so that he could increase his earnings. S31's mood changed from one of apathy and glumness to a more cheerful and smiling state during this time, as he appeared pleased with the products of his efforts. During the latter part of the session, S31 responded rapidly and continuously in the presence of the red light even when no instructions were given to him. S31's frequency of responding for this session was 15 times greater than that for any of the first five sessions.

The *E* also sat next to the *S* during Session 7. The session had been scheduled so that the *E* would give instructions after the *S* was exposed to two sets of trials in the presence of the S^D. The *S* responded so quickly and continuously during these trials, however, that the *E* refrained from giving instructions. After one-half of the session was completed, the *E* left the room. The *S* continued to pull the lever at the same consistent response rate. *S*31's response frequency for this session was over 20 times greater than that for any of the first five sessions.

Session 7 was extended for a 15-minute period in which the *E* wished to determine whether the *S* could perform appropriately if the stimulus conditions were reversed; that is, if the absence of the red light became the discriminative stimulus ($\underline{S}^D$) for responding, and the presence of the red light the discriminative stimulus (S^Δ) for not responding. The *S* was told, "The condition under which you are paid will be changed now; let's see if you can figure it out." The *E* left the room. The *S* responded during S^Δ but soon stopped pulling the lever when no reinforcers followed. Several sets of trials under these conditions were presented; *S*31 did not respond under S^D or S^Δ. The *E* re-entered the room and asked, "Do you have any ideas when you might be paid now?" The *S* answered, "No." The *E* asked him when he had been paid previously. The *S* replied, "When the red light was on." The *E* asked him what other alternatives for payment might exist in the present situation. The *S* replied, "I don't know." The *E* told the *S* to try pulling the lever when the red light was off. The *E* left the room. This time the *S* responded appropriately under reversed conditions for several sets of trials. The *E* re-entered the room and said, "The conditions under which you are paid will be changed again in a short while;

let's see if you can figure it out this time." The E again left the experimental room. S31 continued to respond appropriately. As soon as his responses failed to produce reinforcers, however, he switched responding to the appropriate stimulus condition for reinforcement which the Es had again reversed. S31 smiled broadly as his appropriate responses again produced reinforcements. This was the most positive state in which the S had been observed.

Two other Ss (S21 and S13) participated in the lever-pull experiment. S21 had achieved a fairly high and consistent rate of verbal responding with good discriminative control, and the Es were interested in observing the transfer of this performance to the lever-pull situation. Figure 28 shows that S21 responded appropriately during the S^{Δ} and S^{D} conditions, maintaining an error rate of less than ten per cent of incorrect responses (S^{Δ}) over the five sessions in which he participated. His response characteristics resembled those of normal Ss, in that his latency of responding to the onset of the red light was short. He continued to respond throughout the appropriate S^{D} interval, and his response frequencies, though initially low, continued to rise over successive sessions. S21's frequency of responding increased from 170 responses for the first session to 670 responses on the fifth session. The schedule of reinforcement for this S had been gradually shifted from FR1 to FR5 over the five sessions in which he participated as S21 had steadily increased his rate of responding.

S13, the fourth S to participate in the lever-pull experiment, had not been under discriminative control of the red light in the verbal conditioning situation. Figure 29 shows that in the lever-pull situation, S13 also was not under discriminative control as he responded at approximately the same frequencies during S^{D} as during S^{Δ} for the six sessions in which he participated.

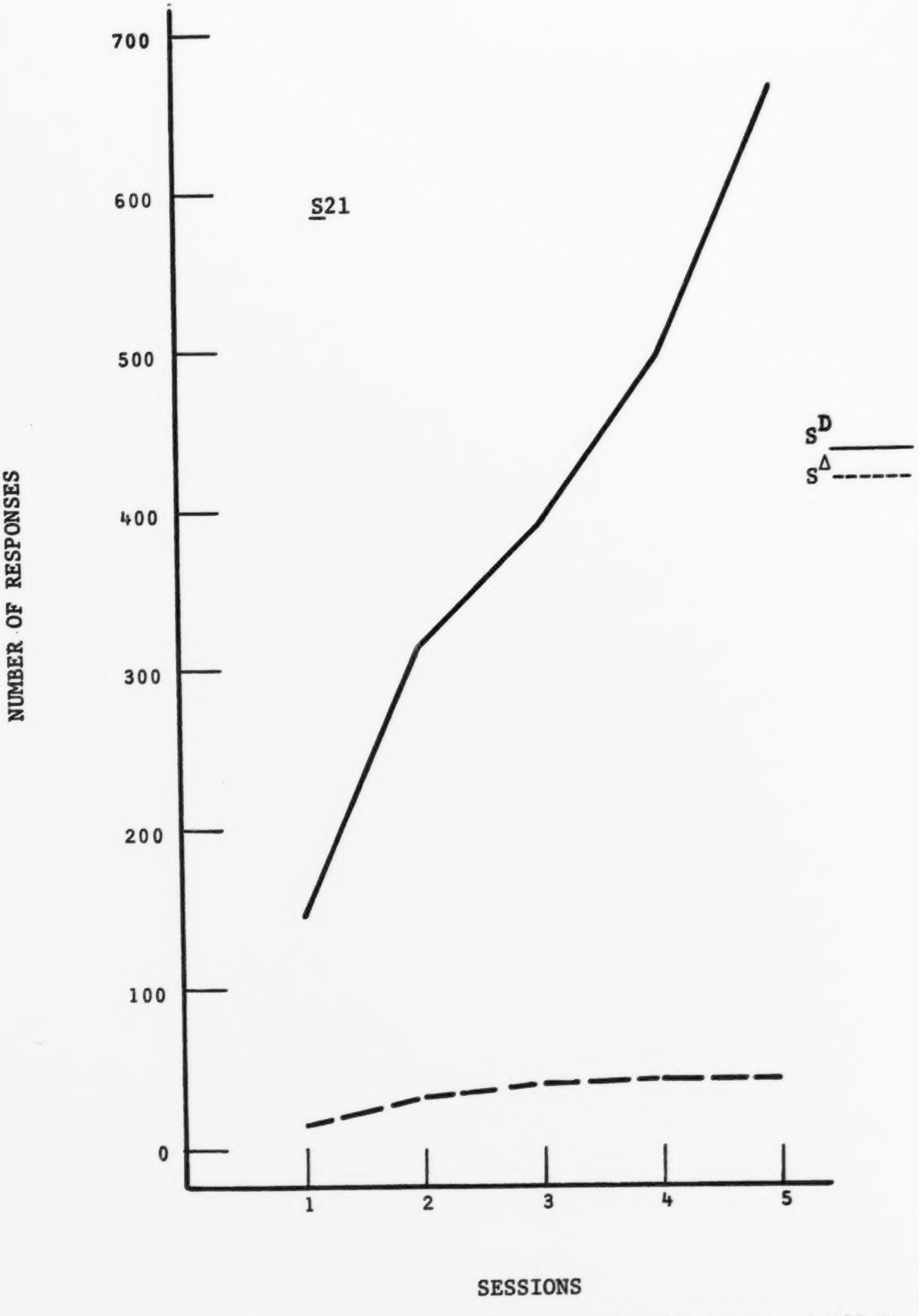


FIGURE 28. Frequency of Lever-Pull Responses of S21 During S^D and S^Δ Conditions.

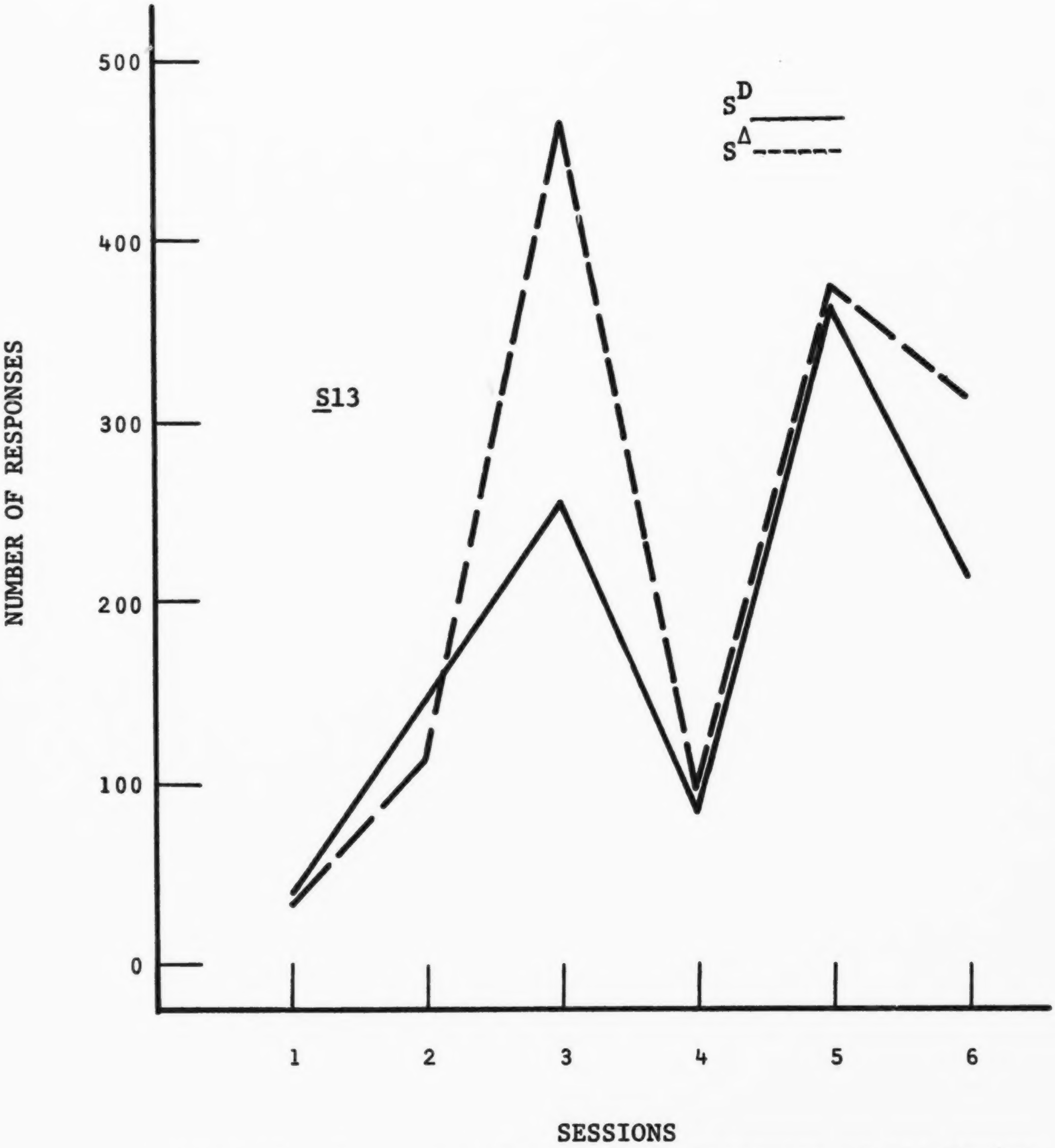


FIGURE 29. Frequency of Lever-Pull Responses of S13 During S^D and S^Δ Conditions.

Although S13 had responded minimally to reinforcement-plus-prompting via the headset in the verbal conditioning situation, it had not been clearly established whether or not the M&M candies were serving as reinforcers for him. During the first two sessions of the lever-pull experiment, S13 received washers as secondary reinforcers for pulling the lever. In both the verbal conditioning situation and the lever-pull experiment, money did not appear to have reinforcing value for S13. He was unable to execute the appropriate exchanges with it for other goods, and often the E had to remove the coins from his mouth to prevent him from swallowing them.

The S pulled the lever in an erratic manner and at low frequencies during the first two sessions. The metal washers proved insufficient in maintaining his responding over an entire session, and S13 failed to respond entirely during the latter part of these two sessions. M&M's were substituted for the washers during Session 3 and S13 tripled his frequency of lever-pulling over the two preceding sessions. Since S13 continued to respond over an entire session when he received M&M's, M&M's were used as reinforcers in the following sessions. S13 continued to respond throughout the entire session under these conditions, although he continued to pull the lever during S^{Δ} as many times or more than he did during S^{D}.

It had been difficult to determine whether or not M&M's were reinforcing for S13 in the verbal conditioning experiment. Although it was conducted in a different modality (that of a motor response), the lever-pull experiment demonstrated that M&M's could serve as an effective reinforcer for an S who did not respond for this same reinforcer in the verbal conditioning situation. It is possible that the candy stimulus itself was insufficient to act as a reinforcing event for S13 in the verbal conditioning situation. The verbal behavior required for reinforcement could have been aversive for this S or demanded such effort that the candy or money had less value here than in the lever-pull situation. Since Ss participated in both experiments during the same times of day, the deprivation and satiation states of the Ss when they arrived at the experimental setting should not have affected the value of candy or money more in one situation than in the other. It is also possible that some Ss did not understand the instructions, or that they simply could not learn to emit the verbal responses required for reinforcement, although they still desired the candy or money. The implication of this study, however, goes beyond the traditional reinforcement conception in that it appears that the same stimulus might or might not serve as a reinforcer for responses emitted through different modalities by an individual S.

The two experimental situations could have been perceived as being radically different for S11 and S13. The high rates of lever-pulling achieved by these Ss could reflect the impersonal nature of this kind of response. On the other hand, verbal behavior usually occurs in an inter-personal situation, so that Ss in the reinforcement-only group could have experienced considerably more difficulty in producing verbal behavior than in performing a motor response under similar conditions.

The inter-personal nature of verbal behavior could explain the higher rates of responding for Ss in conditions in which a model was present than for Ss in the reinforcement-only condition. Even in the lever-pull experiment, instructions given by the E in the experimental room resulted in increased rates of lever-pulling for S11 and S31 (see Figure 26 and Figure 27).

Implications

The results of this study are suggestive of research that could further explore and clarify the effects of the various procedures employed here, and are indicative of relevant applications to social work practice. In a future experiment, the verbal conditioning situation might be structured to approximate the simplicity of the lever-pull situation. Projecting a word or words on a screen along with the slide could be used to specify the verbal response required of the S. Reading the word or imitating the sound of the word might reduce the effort of emitting a verbal response in this situation. By requiring an S to respond echoically or to text in this manner, the E could narrow the potential class of appropriate responses made to a particular slide as well as influence the S's choice of appropriate responses to that picture. In the modeling situations in the present study, the Ss were presented with a variant of such a proposed condition, in that the model provided auditory stimuli which the S could select as discriminative or supporting stimuli for his own speech. Combinations of auditory stimuli and projected words also could be employed in attempts to facilitate the S's production of verbal behavior.

Reinforcing and discriminative stimuli in this study could have been inadequate or insufficient to maintain or evoke verbal behavior in some Ss. Perhaps more potent stimuli could be found to serve as reinforcers for verbal behavior. Different kinds of visual slides should be tested to determine their relative effectiveness in eliciting speech from the Ss.

It is also possible that some Es or models are more effective than others in the verbal conditioning situation. Pilot research in the present study, as well as the prompting via the headset procedure, indicated that verbal behavior could be elicited and maintained without the E being present in the room with the S. The importance of the E's or model's own verbal behavior in eliciting speech from the S was demonstrated in this study. A next step in experimentation would be to present a recording of the E's or model's voice to the S over the headset; in this way, some properties of the model's speech, such as pitch and pauses, could be presented without variation to different Ss and to the same S on different occasions. The inter-personal nature of verbal behavior might necessitate that the E first elicit verbal behavior in the presence of the S, and then gradually fade out cues to the S until the E finally elicits verbal behavior via the headset alone.

Because comparisons with normals were not attempted in this study, the procedures should be employed with non-psychotic populations to determine the characteristics of their responding. Perhaps norms could be established for appropriate responding in the verbal conditioning situation.

A question for further investigation concerns the effects of the lever-pull experiment on verbal conditioning. It would be interesting to determine if an increased rate of responding to the lever-pull condition would result in a generalized effect of increased responding in the verbal conditioning situation. As Ss in this study had not been tested first on the lever-pull response, it could not be determined whether or not an S's appropriate responding in the verbal conditioning generalized to the lever-pull; the rapid acquisition observed in this study could have been due to the S being a fast learner in the lever-pull situation as well as to generalization.

If it could be shown that the effects of the lever-pull experiment generalized to a verbal conditioning situation, the lever-pull condition could be used as a screening device to determine whether or not an S would be suitable for the verbal conditioning procedures. In addition to facilitating learning in verbal conditioning situations, such a screening technique could save considerable time, money, and effort for personnel interested in improving patients' verbal behavior. Having established the appropriate reinforcement contingencies in the lever-pull condition, the S could enter the verbal conditioning situation having some familiarity with the procedure. Another advantage of this screening device would be that Ss might be undergoing a form of desensitization during adaptation to the lever-pull situation prior to entering the verbal conditioning program.

Future investigation of the variables related to producing changes in verbal behavior in chronic schizophrenics could lead to the identification of specific procedures which are shown to be effective in producing changes in verbal output for specific classes of patients. Whether or not these classes should conform to standard diagnostic forms of schizophrenia remains to be answered by pursuing this line of research. The fact remains, however, that different Ss exhibit different kinds of repertoires available for experimental manipulation. The frequency of verbal behavior developed in different Ss might vary considerably in content, so that further shaping procedures might be required before a patient could communicate effectively.

As mentioned earlier, this study has relevance to social work in its systematic isolation and investigation of the effects of the variables related to producing verbal behavior. This knowledge is of particular relevance to social workers, psychologists, and psychiatrists, in that it could lead to an anatomization of the controlling variables in the client-therapist relationship. Social workers make extensive use of interviewing in their practice; through the medium of words, the social worker endeavors to influence the client's behavior. If the social worker knows how to control his own behavior with regard to the variables discussed in this study, he could present to the client cues that might maximize the effects of the client-therapist relationship. The warm and accepting therapist has traditionally been recognized as the paragon for such effects; if, for example, one wanted to program warmth and acceptance in an interviewer, it could be done in a more precise fashion by determining the functional relevance of these concepts for various individuals. Different models may, of course, have different effects on verbal behavior in a particular individual, but there may be some consistent characteristics of effective models which could be taught to students.

The study has further relevance to social work, in that many institutionalized psychotics, autistic children, and individuals of lower socio-economic status who are social work clients demonstrate deficiencies in verbal behavior. Limitations in verbal behavior may cause these individuals to suffer disadvantages such as less material gain, major learning problems, and limitations in employment and career advancement. Social workers equipped with skills in developing verbal behavior could apply these techniques in various settings where these problems occur. In particular, social workers could take an active role in language development programs for pre-school and school-age children, so that these children might not be handicapped in a modern society that judges an individual's successful adaptation on the basis of his ability to communicate verbally with others.

A final implication of this study appears from the findings on the effects of verbal cuing by the E or model in the prompting and elicitation procedures. The cuing enabled Ss to perform appropriately in situations in which they had responded inappropriately. If such cuing devices could be systematically applied in a practical fashion to patients in their everyday living situations, one could conceive of "orthogenic" devices which could help even regressed hospitalized patients to perform functional behaviors. Patients could be employed by industrial organizations to perform various tasks. With the proper cuing system developed for individual patients, it is possible that the patients could perform and maintain appropriate work behaviors.

Summary and Conclusions

The study consisted of four parts: 1) verbal conditioning of mute and near-mute chronic schizophrenics using four experimental groups and two control groups; 2) four extra-laboratory measures for testing generalization from the experimental setting to the ward; 3) continuation of verbal conditioning with the same, different, or additional experimental procedures systematically applied to selected Ss in various probing strategies; 4) conditioning a lever-pull response.

The results of the first ten sessions of verbal conditioning indicated the effects of specific experimental procedures administered to the Ss. Ss in Group 1 produced minimal verbal behavior, whereas most of the Ss in Groups 2, 3, and 4 showed medium or high increases in verbal output. Two Ss were under discriminative control of the slides and responded appropriately to the S^D and S^Δ conditions. On the post-experimental baseline, control Ss did not increase in verbal behavior over the pre-test baselines. Comparisons among groups were ruled out by high intra-group variances of experimental Ss over the conditioning sessions.

The four extra-laboratory measures did not indicate generalization of the Ss' verbal behavior from the laboratory setting to the ward. The inconsistency of the extra-laboratory findings with those of the conditioning setting, as well as the low inter-rater reliabilities, precluded serious consideration of these data.

Five additional conditioning sessions were conducted with some Ss under the same procedures as in the first ten sessions, while other Ss received prompting and response elicitation procedures; several Ss were systematically switched from one major treatment condition to another to determine the effects of the removal or addition of an experimental variable. After Session 15, four Ss underwent further sessions involving various probing strategies.

The prompting and elicitation procedures were of considerable value in elucidating the conditions under which verbal behavior could be produced in particular Ss, and indicated the crucial importance of the E's or model's own verbal behavior in increasing the Ss' verbalizations. Systematically switching an S from one experimental procedure to another also explored the relative effects of each procedure. High or moderate increases in the verbal outputs of eight Ss indicated that some of the combinations of experimental treatments might be considered by therapists engaged in reinstating or developing verbal behavior.

The fourth part of this study concerned the relationship between an S's performance in the verbal conditioning and his performance in a lever-pull experiment. Four Ss who had participated in the verbal conditioning situation were reinforced for pulling a lever. The data indicated that Ss who responded under the appropriate or inappropriate stimulus conditions in the verbal conditioning situation responded similarly in the lever-pull experiment. The data also showed that Ss conditioned at a higher rate on the lever-pull than in the verbal conditioning. A major finding of the lever-pull experiment was that the same stimulus that had not been a reinforcer in the verbal conditioning experiment served as a reinforcer for the lever-pull response. It thus appears that the reinforcement value of the same stimulus varies from situation to situation or among response classes for the same Ss.

Footnotes

[1] This study was supported in part by funds from a Horace H. Rackham Dissertation Research Grant and the Center for Research on Language and Language Behavior under Contract OEC-3-6-061784-0508 with the U. S. Department of Health, Education, and Welfare, Office of Education, under the provisions of P. L. 83-531, Cooperative Research, and the provisions of Title VI, P. L. 85-864, as amended. It is also one of two theses submitted to the Office of Education as part of *Studies in Language and Language Behavior*, *Progress Report No. VII*, September 1, 1968.

[2] The terms "verbal output," "speech output," "verbal response," "verbal behavior," "vocalization," and "verbalization" are used interchangeably where frequent repetition of one of these referents could make the reading of the text cumbersome. Verbal behavior as described by these terms is considered in the broader sense as non-reflexive sound emissions of the *Ss* which ranged from giggles and unintelligible utterances to intelligible words, phrases, and sentences.

[3] While "reinforcer" is strictly defined in terms of behavioral effect, for purposes of clarity the stimuli described here will be referred to as "reinforcing stimuli," even though in some cases their effect on an *S*'s behavior is questionable.

[4] Prompts were given by the *E* over the microphone to the *S*'s headset. A prompt consisted of either a general statement (e.g., what do you see in the picture?) or a specific one (e.g., are the boys in the pictures sitting or standing?). Elicitation consisted of the same type of cuing as in prompting, except that elicitation occurred within the interpersonal context of the *E* in the experimental room with the *S*. Elicitation also was used by the *E* during the *Demonstration* Session and in the "Storekeeper" situation.

[5] See Appendices F, G, H, and I, respectively, for descriptions of the Observational Time Sampling Procedure, the Magazine Pictures Test Procedure and copies of the Wilson-Walters Verbal Behavior Rating Sheet, and the L-M Fergus-Falls Behavior Rating Sheet.

[6] Most of the material in these case histories are taken from ward notes and the case files of patients at Ypsilanti State Hospital.

Appendix A

pages 105 - 108

and

Appendices C through I

pages 112 - 124

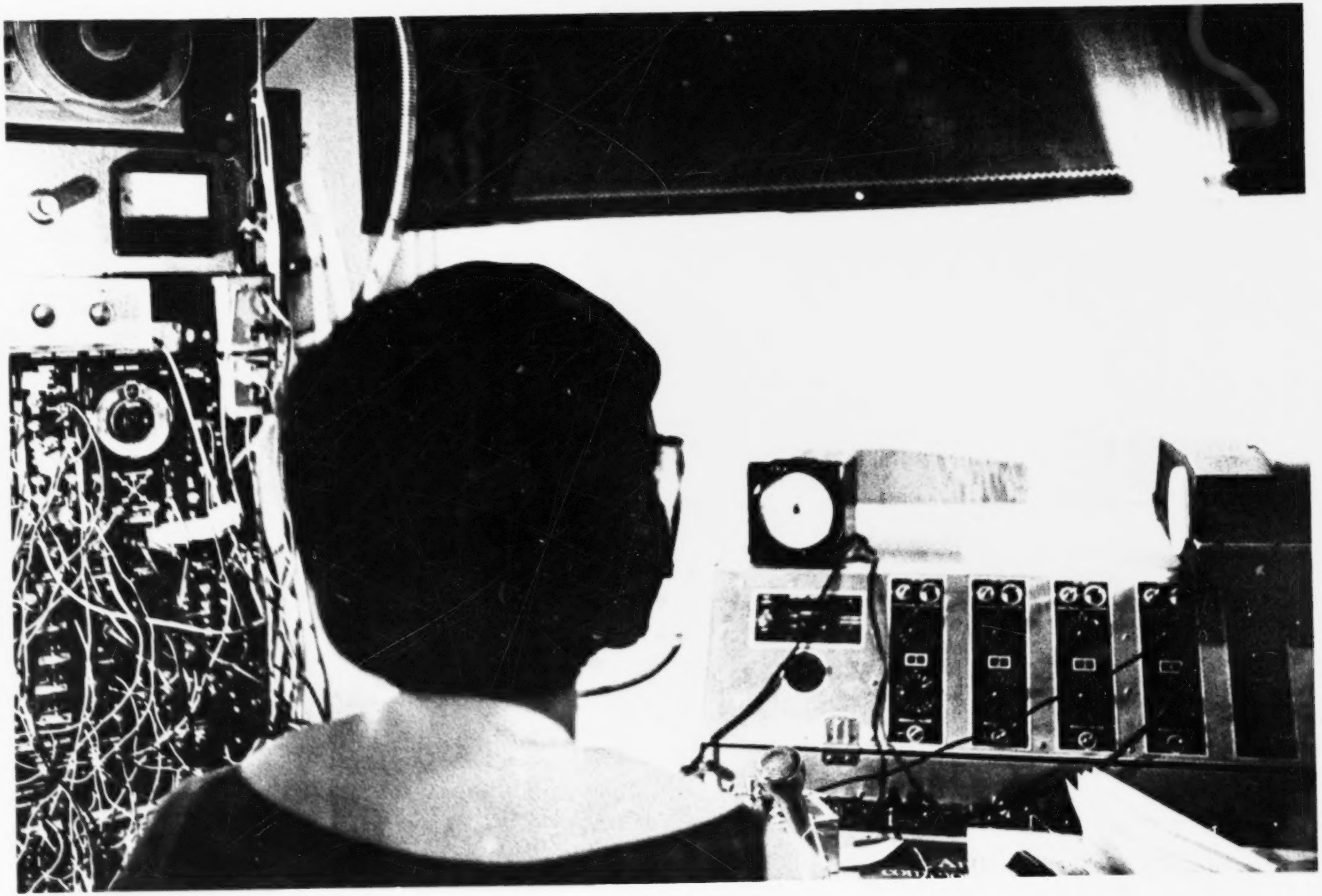
available from author on request.

APPENDIX B

Photographs of the Experimental Setting

Photograph 1 shows some of the operant conditioning equipment and other apparatus used by the *E*s in the control room. To the left of the *E* is a relay rack housing the tape recorder and the automatic equipment. The microphone and data sheet are located on the table in front of the *E*. To the left of the microphone is a panel with a switch that controls the S^D light. Directly above the microphone is the timer; to the right of the timer is the slide projector. The slide is projected through the one-way-vision screen to the wall in the experimental room.

Photograph 2 shows a university student sitting in the experimental chair used by the *S*s in the study. He is wearing the headset with attached microphone. The chute for delivering pennies and M&M's is on the *S*'s left. Behind him on the one-way-vision screen is the reflected image of a slide. The slides are projected on a wall in front of the student. Directly behind the student and to his left is a circular hole that was cut through the one-way-vision screen, so that the beams from the slide projector pass directly to the experimental room. At the right of the picture is an *E* who served as a model in the study. In the *model-only* (Group 2) and *model-plus-reinforcement* (Group 3) conditions, the model sat in the same location as shown here, although he was visually separated from the *S* by a baffle. In the *model-plus-reinforcement-plus social reinforcement* condition (Group 4), the model sat to the right of the *S* during the S^D condition and sat in the experimental chair during S^{Δ}.



PHOTOGRAPH 1. Some Operant Conditioning Equipment and Other Apparatus in the Control Room.

PHOTOGRAPH 2. Model and S Seated in the Experimental Room.

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